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United States Environmental Protection Agency

Office of Emergency and Remedial Response

EPA/ROD/R05-91/181
September 1991

EPA

Superfund Record of Decision:

Stoughton City Landfill, WI

50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO. EPA/ROD/R05-91/181	2.	3. Recipient's Accession No.
4. Title and Subtitle SUPERFUND RECORD OF DECISION Stoughton City Landfill, WI First Remedial Action - Final			5. Report Date 09/30/91 6.
7. Author(s)			8. Performing Organization Rept. No.
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12. Sponsoring Organization Name and Address U.S. Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460			13. Type of Report & Period Covered 800/000 14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

The 27-acre Stoughton City Landfill site is a former waste disposal facility in Stoughton, Dane County, Wisconsin. The site was an uncontrolled dump site from 1952 to 1969, and later from 1969 to 1977 operated as a State-licensed landfill covering approximately 15 acres. Land use in the area is predominantly agricultural and residential, with several wetlands areas located adjacent to the site. In addition, part of the site lies within the 100-year floodplain of the Yahara River, located west of the site. From 1954 until 1962, liquid wastes were commonly poured over garbage and burned. In addition, some liquid wastes were poured down holes drilled to test auger drilling equipment. From 1969 to 1977, both solid and liquid municipal wastes were disposed of at the Stoughton Landfill. In 1977, the State required that the site be closed and initiated closure activities that included constructing a trash transfer station, placing cover materials, applying topsoil, and seeding. As a result of improper disposal activities, a number of investigations were conducted by the State and EPA that revealed ground water contamination resulting from leachate discharge and surface water runoff from the landfill. This Record of Decision (ROD) addresses soil and ground water contaminated by leaching landfilled waste. The

(See Attached Page)

17. Document Analysis a. Descriptors

Record of Decision - Stoughton City Landfill, WI
First Remedial Action - Final
Contaminated Media: soil, debris, gw
Key Contaminants: VOCs (benzene, tetrahydrofurans, toluene, xylenes), other organics (PAHs), metals (arsenic, chromium, lead)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 65
	20. Security Class (This Page) None	22. Price

EPA/ROD/R05-91/181
Stoughton City Landfill, WI
First Remedial Action - Final

Abstract (Continued)

primary contaminants of concern affecting the soil, debris, and ground water are VOCs including benzene, tetrahydrofurans (THF), toluene, and xylenes; other organics including PAHs; and metals including arsenic, chromium, and lead.

The selected remedial action for this site includes placing a solid waste disposal facility cap over the site; excavating wastes in contact with ground water along the southeastern and northeastern sections of the site and consolidating these wastes under the cap; pumping and treatment of contaminated ground water unless additional monitoring indicates that ground water extraction is not required to achieve compliance with State quality standards, and subsequent onsite discharge of the treated ground water to the Yahara River in compliance with NPDES effluent limitations; long-term monitoring of ground water; and implementing institutional controls and site security measures including fencing the entire site perimeter. The estimated present worth cost for this remedial action is $7,546,000, which includes an annual O&M cost of $329,600 for years 0-5 and $146,600 for years 6-30.

PERFORMANCE STANDARDS OR GOALS: Chemical-specific ground water clean-up goals are based on State Preventive Action Limits (PALs), and include THF 10 ug/l.

RECORD OF DECISION

SELECTED REMEDIAL ACTION
FOR THE
STOUGHTON CITY LANDFILL SITE
STOUGHTON, WISCONSIN

SITE NAME AND LOCATION

Stoughton City Landfill Site
Stoughton, Wisconsin

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Stoughton City Landfill Site ("SCL Site") in Stoughton, Wisconsin, chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and, to the extent practicable, the National Contingency Plan (NCP). The decision is based on the Administrative Record for the SCL Site. The attached index identifies the items which comprise the Administrative Record upon which the selection of the remedial action is based.

The State of Wisconsin has been consulted and concurs with the selected remedial action.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the remedial action selected in this Record of Decision, may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF SELECTED REMEDY

The selected remedial action will be the final remedial action at the Site. The remedy will address Site risks through placement of cap over the landfill area which meets the requirements of ch. NR 504, Wis. Adm. Code, in order to minimize the infiltration of

precipitation through the in-place wastes; extraction and above-ground treatment of contaminated groundwater to the west of the Site unless additional monitoring indicates that groundwater extraction is not required to achieve compliance with the State's ch. NR 140 groundwater quality standards; and excavation and consolidation of wastes in contact with groundwater along the southeastern and northeastern sections of the Site. The major components of the selected remedial action include:

* Site security measures including the placement of a fence around the entire Site perimeter;

* Placement of a solid waste disposal facility cap (NR 504 cap) over the Site;

* Extraction and treatment of contaminated groundwater, unless additional monitoring indicates that groundwater extraction is not required to achieve compliance with the State's ch. NR 140, Wis. Adm. Code, groundwater quality standards, and subsequent discharge to the Yahara River of the treated groundwater in compliance with Wisconsin Pollution Discharge Elimination System (WPDES) effluent limitations;

* Excavation of wastes in contact with groundwater in the southeastern and northeastern sections of the Site, and consolidation of these wastes under the cap;

* Land use restrictions to prevent the installation of a well within 1200 feet of the property boundary and to prevent residential development of the Site;

* Long-term groundwater monitoring to confirm the effectiveness of the other components of the selected remedial action.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. The remedy utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element, with respect to the groundwater component of the selected remedy. However, because treatment of the principal threats of the Site was not found to be practicable, this remedy does not satisfy the preference for treatment as a principal element.

Because this remedy will result in hazardous substances remaining on-site above health-based levels, a review will be conducted within five years after commencement of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

Valdas V. Adamkus
Regional Administrator

9/30/91
Date

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Carroll D. Besadny
Secretary

101 South Webster Street
Box 7921
Madison, Wisconsin 53707
SOLID WASTE TELEFAX 608-267-2768
TELEFAX 608-267-3579
TDD 608-267-6897

September 30, 1991

IN REPLY REFER TO: 4440

Mr. Valdas V. Adamkus, Regional Administrator
U.S. Environmental Protection Agency
230 S. Dearborn Street
Chicago, IL 60604

SUBJECT: Selected Superfund Remedy
Stoughton City Landfill

Dear Mr. Adamkus:

The Department is providing you with this letter to document the State of Wisconsin's concurrence on the proposed remedy for the Stoughton City Landfill Superfund site. The proposal, as identified in the draft Record of Decision includes the following:

Alternative 7a: **Capping with Waste Consolidation, and a Groundwater Extraction/Treatment System, unless additional data indicates that a groundwater extraction system is not required to comply with State groundwater quality standards.**

A cap with a passive gas extraction system, in compliance with NR 504 Wis. Adm. Code, will be placed over the waste mass, after saturated wastes have been excavated and placed over portions of the site where wastes are not saturated. In addition, a groundwater extraction and treatment system will be installed, unless additional data indicates that a groundwater extraction system is not required to comply with State groundwater quality standards. The groundwater system and the capping will be designed to have minimal impacts on the surrounding wetlands.

Estimated Costs: Construction - $5,200,000
(Alternative 7A) Operation and Maintenance - $393,800 1st 5 years;
$146,600 after 5 years
30 Year Present Worth - $8,500,000

The Department concurs with the selected remedy described above and presented in the Record of Decision for this site. We believe that the addition of contingency language relating to the groundwater extraction system is an appropriate response to the public comments received.

The State of Wisconsin will contribute 50% of the remedial action costs associated with this remedy at the Stoughton City Landfill if the potentially responsible parties (PRPs) do not agree to fund the remedy. This assurance is provided on the condition that U.S. EPA will pursue all legal action against the PRPs, including issuance of a unilateral order and litigation of such order, prior to expending the Fund.

We also understand that our staff will continue to work in close consultation with your staff during the remaining investigative work associated with the delineation of groundwater contamination at the Stoughton City Landfill site, as well as during the design and construction of the remedy.

Thank you for your cooperation in addressing this contamination problem at the Stoughton City Landfill site in Stoughton. If you have any questions regarding this matter, please contact Mr. Paul Didier, Director of the Bureau of Solid and Hazardous Waste Management, at (608) 266-1327.

Sincerely,

C.D. Besadny, Secretary
Wisconsin Department of Natural Resources

CDB:RS

cc: Lyman Wible - AD/5
Linda Meyer - LC/5
Paul Didier - SW/3
Joe Brusca - SOD
Pat McCutcheon/Mike Schmoller - SOD
Mary Pat Tyson/Mike Valentino - US EPA Region V (5HS/11)
Mark Giesfeldt/Sue Bangert/Robin Schmidt - SW/3

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION
STOUGHTON CITY LANDFILL SITE
STOUGHTON, WISCONSIN

****

TABLE OF CONTENTS

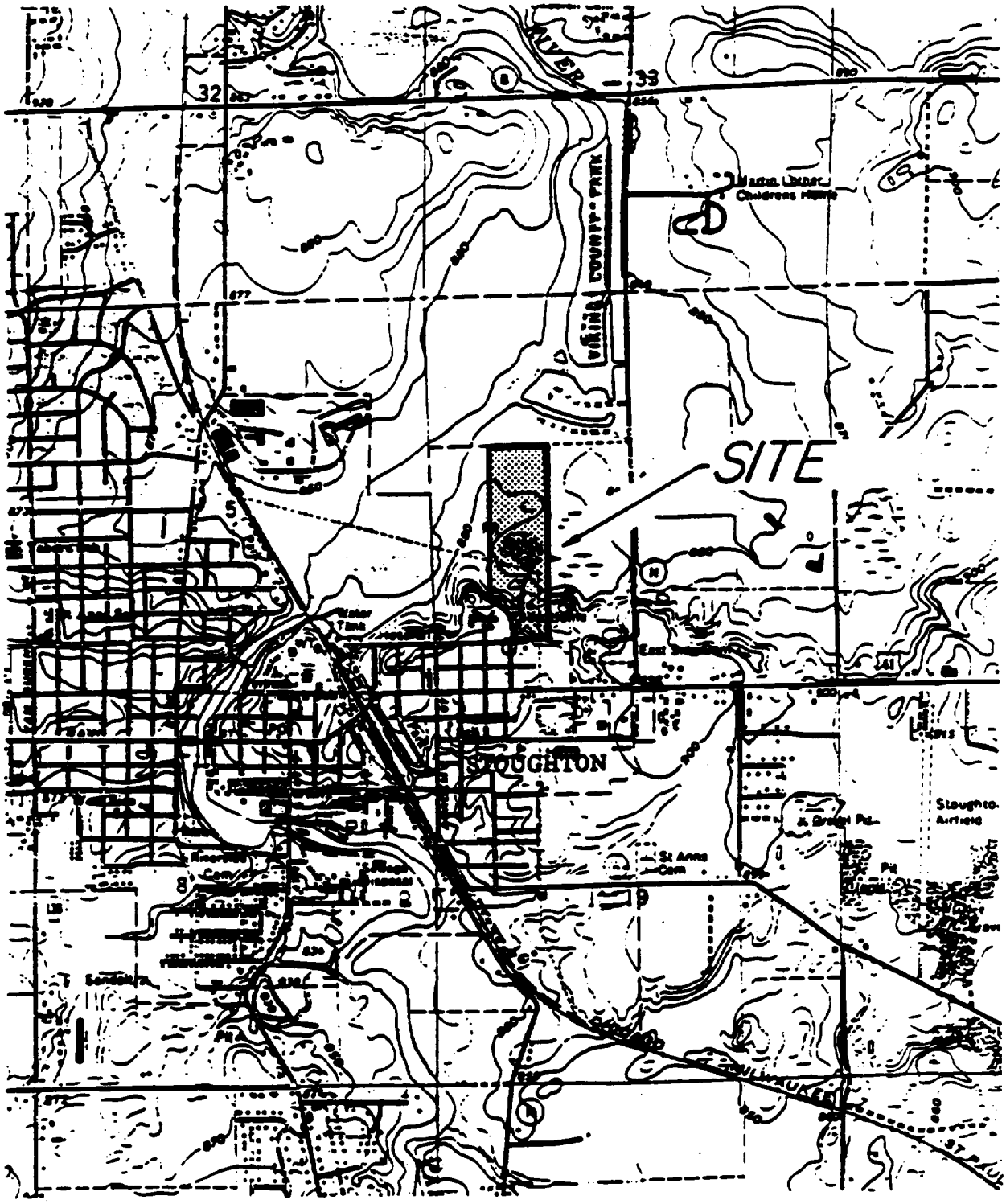
SUMMARY OF REMEDIAL ALTERNATIVE SELECTION
Stoughton City Landfill Site
DANE COUNTY, WISCONSIN

I. SITE LOCATION AND DESCRIPTION

The Stoughton City Landfill Site is located in the northeast portion of Stoughton approximately 13 miles southeast of Madison, in Dane County, Wisconsin. (Figure 1-1.) The property containing the landfill Site encompasses approximately 27 acres and occupies portions of the W 1/2 of the SW 1/4 and the SW 1/4 of the NW 1/4 of Section 4, T.5N., R.11E. Although the landfill property originally occupied approximately 40 acres, landfilling has occurred on only about 15 acres of the property. Since 1982, land exchanges between the City and the owner of an adjacent property have modified the original property boundaries (Figure 1-3).

Figures 1-4 and 3-2 show existing Site conditions and topography, respectively. A wetland area that existed in the southeast portion of the current property boundary was the initial area of waste disposal. Wetlands occur adjacent to the southeast portion of the Site, in the north portion of the Site, and west of the Site along the Yahara River. The Yahara River is located west of the Site and comes within approximately 400 feet of the Site at its closest distance. The 100-year flood stage near the Site is 843 feet above mean sea level. The area of the Site in which waste disposal practices took place is elevated with respect to the flood stage (see Figure 3-3). Approximately 1/8 of the Site (the northeastern section which consists of wetlands) is situated within the 100-year floodplain of the Yahara River (see Figure 3-2 which shows lowland area of Site with respect to flood stage, i.e., elevation 843 above MSL). The nearest developed land occurs along Amundson Parkway, the Site access road to the south, where residential homes have been built. A more extensive residential area occurs approximately 1/4 mile south of the Site, where the City street grid pattern begins. The land immediately adjacent to the southern Site boundary remains undeveloped. There is no developed land in the vicinity of the Site to the west, north or east.

Surface water flow patterns indicate radial flow outward from the Site. Surface water runoff over most of the northern portion of the property flows to the drainage ditch in the north-central portion of the Site. This drainage ditch originates east of the Site and also receives flow from the wetland adjacent to the southeast portion of the property and land east of County Highway N. Surface water in the southwestern portion of the Site flows toward the drainage ditch along the southern property boundary,



APPROXIMATE SCALE (ft)

1000 0 1000 2000

Ref.: USGS, 7.5 - MINUTE STOUGHTON QUADRANGLE, DANE CO., WISCONSIN

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FIGURE 1-1

SITE LOCATION MAP

STOUGHTON CITY LANDFILL

STOUGHTON, WISCONSIN

DRAWN: JDG	DATE: 3/6/90	PROJECT NUMBER 6885-002
APPVD:	REVISED:	DRAWING NUMBER

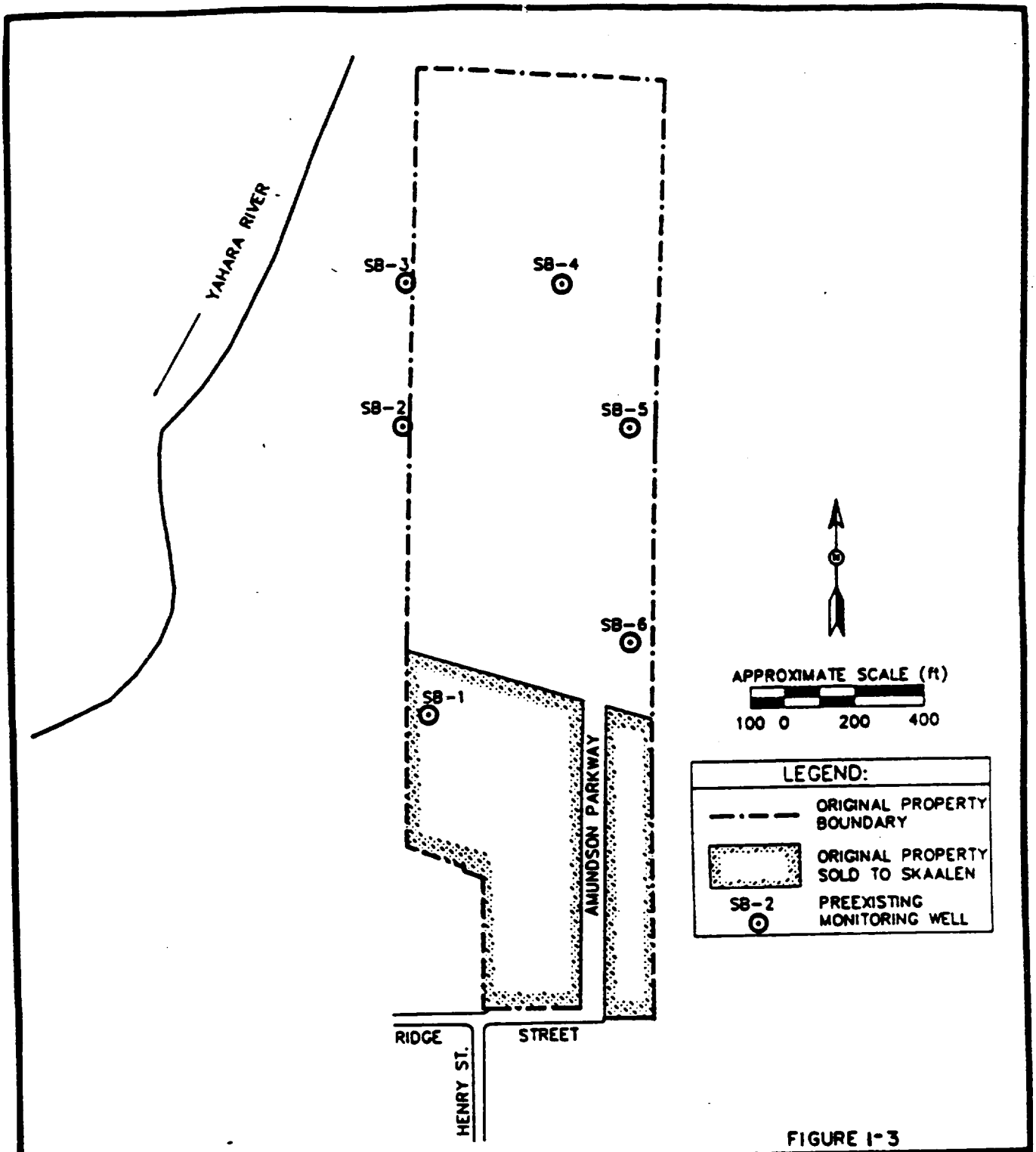

FIGURE 1-3

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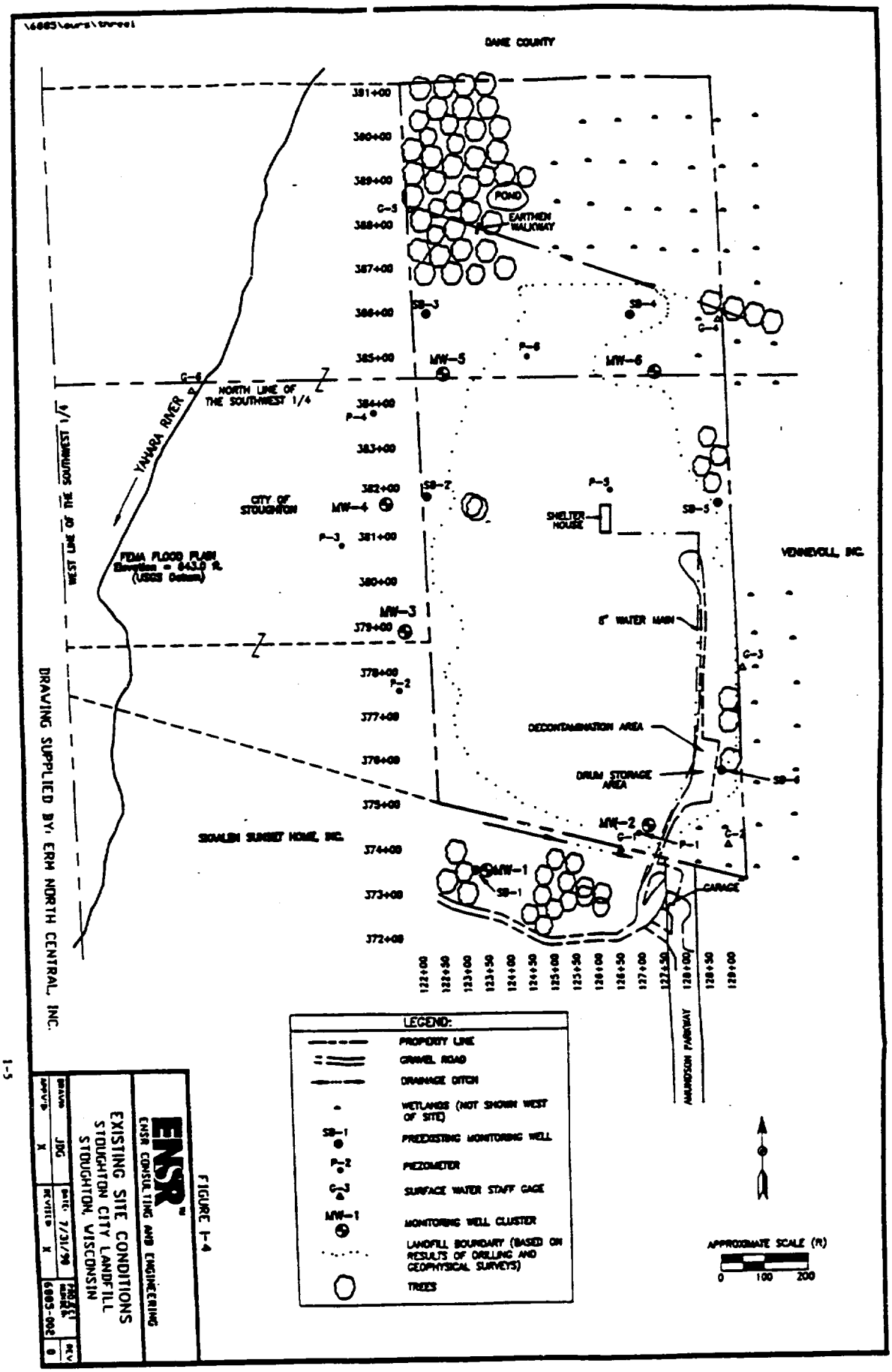
PREEXISTING MONITORING WELL LOCATIONS

STOUGHTON CITY LANDFILL
STOUGHTON, WISCONSIN

DRAWN: HWW	DATE: 7/31/90	PROJECT NUMBER: 6885-002
APP'D:	REVISED:	DRAWING NUMBER:



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EXISTING SITE CONDITIONS
STOUGHTON CITY LANDFILL
STOUGHTON, WISCONSIN

DRAWN	DATE
JDG	7/31/98
REVIEWED	PROJECT NUMBER
X	6985-002

REV: 0

FIGURE 1-4

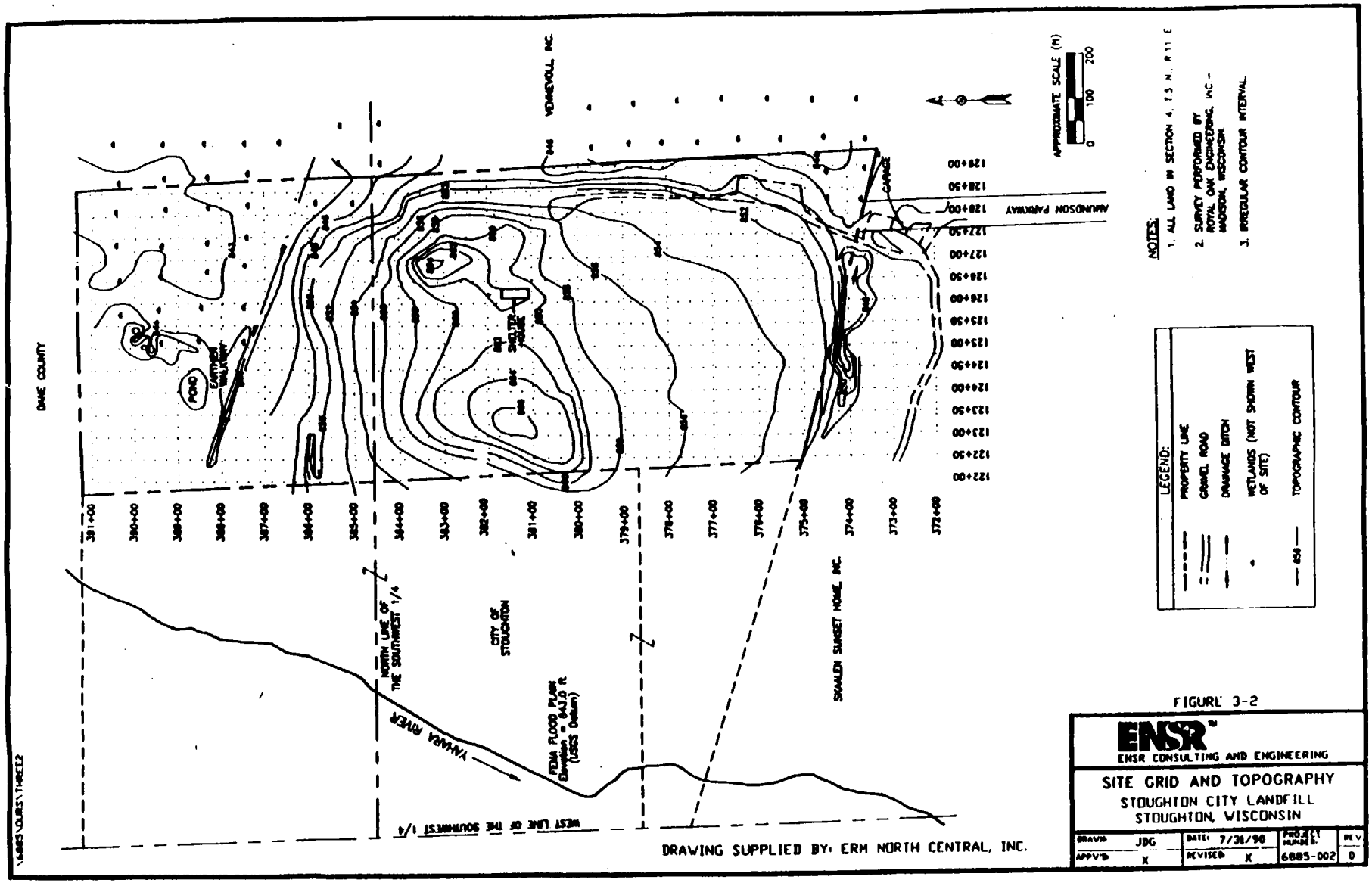


FIGURE 3-2

ENSR CONSULTING AND ENGINEERING

SITE GRID AND TOPOGRAPHY
STOUGHTON CITY LANDFILL
STOUGHTON, WISCONSIN

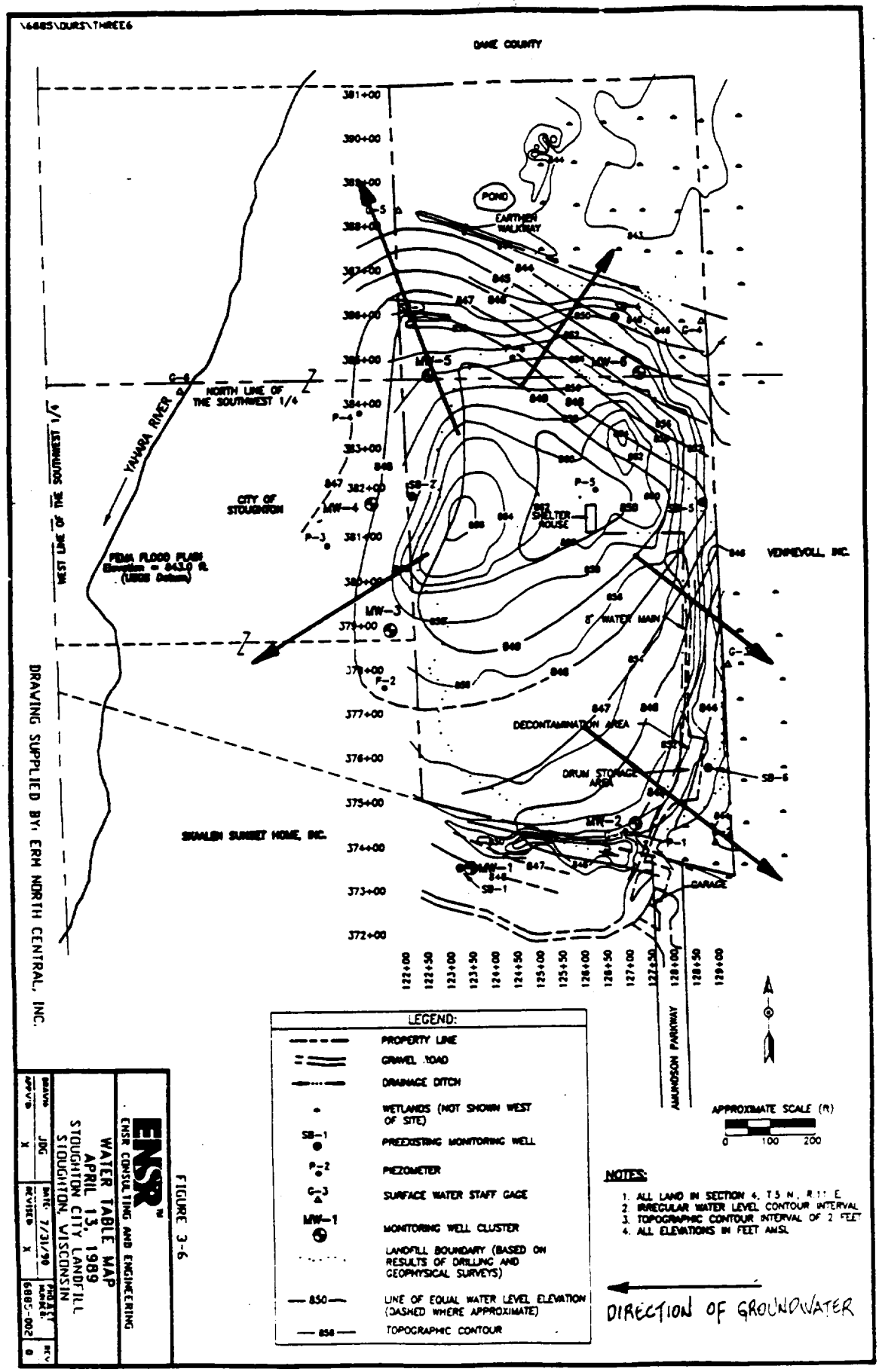
DRAWN	JDG	DATE: 7/31/90	PROJECT NUMBER	REV
APP'D	X	REVISED X	6885-002	0

which drains toward the wetlands adjacent to the southeastern portions of the Site. Surface water in the south-central and southeastern portions of the property drains directly to the wetlands. In summary, most of the surface water drains to wetlands east and north of the Site and eventually flows to the Yahara River via a drainage ditch. A small portion of the west-central area of the Site drains directly into the wetlands adjacent to the Yahara River. (Figure 3-3).

Surficial deposits in the vicinity of the Site include ice-contact stratified deposits and lacustrine plain sediments (Mickelson and McCartney, 1979). Ice-contact stratified deposits generally include significant sand and gravel deposits and land forms such as kames and eskers. These deposits occupy higher ground within the landfill and south of it. Lacustrine plain or glacial lake-bottom sediments are generally composed of fine-grained silt and clay. Some sand is present near former shorelines and stream inlets. These areas are often flat, poorly drained, and show evidence of peat accumulation. Lacustrine plain deposits occupy the southeast portion of the current property boundary, which was initially developed for waste disposal, and the low-lying ground adjacent to the east, north, and west portion of the Site. Lacustrine plain sediments are generally overlain by younger marsh deposits.

Surficial deposits in the vicinity of the Site are underlain by glacial outwash that was deposited in the preglacial Yahara River Valley. Approximately 150 to 250 feet of unconsolidated glacial sediments are reported to overlie Cambrian sandstone bedrock in the vicinity of the Site (Cline 1965). These unconsolidated sediments consist mostly of stratified and sorted sand and gravel. Some of the outwash in the eastern two-thirds of the county is reported by Cline to contain boulders.

Regional groundwater flow is toward the Yahara River, which serves as a groundwater discharge. Groundwater flow in the surficial aquifer is radial beneath the Site. (Figure 3-6). Average aquifer characteristics of the surficial aquifer are: 1. horizontal flow gradient = 1.36E-02 ft/ft; 2. vertical flow gradient = 2.79E-02 ft/ft (upward); 3. hydraulic conductivity = 15.6 ft/day; and 4. horizontal groundwater velocity = 0.604 ft/day. There are variations around the Site from location to location. For instance, the hydraulic conductivity at monitoring well clusters 3 and 4 is approximately 20.6 ft/day, the average horizontal gradient is 9.11E-03 ft/ft, and the average vertical gradient is virtually zero. Along the southeastern section of the Site, at monitoring well cluster 2, there is an upward vertical gradient of 0.13 ft/ft. The two aquifers are hydraulically connected. Municipal Well #3 is situated about 3000 ft west of the Site and is set in the sandstone bedrock, as an open pipe from roughly 210 ft below ground surface to 940 ft below ground surface.


\6685\DURS\THREE6
DANE COUNTY
POND
EARTHEN WALKWAY
MW-5
MW-6
NORTH LINE OF THE SOUTHWEST 1/4
YAHARA RIVER
CITY OF STOUGHTON
MW-4
P-3
SB-7
P-5
SHELTER HOUSE
SB-5
FEMA FLOOD PLAIN Elevation = 843.0 ft. (USGS Datum)
VENNEVOLL INC.
MW-3
8" WATER MAIN
P-2
DECONTAMINATION AREA
DRUM STORAGE AREA
SB-6
MW-2
P-1
SIGMUND SUNSET HOME, INC.
MW-1
SB-1
GARAGE
AMUNDSON PARKWAY
381+00
390+00
389+00
388+00
387+00
386+00
385+00
384+00
383+00
382+00
381+00
380+00
379+00
378+00
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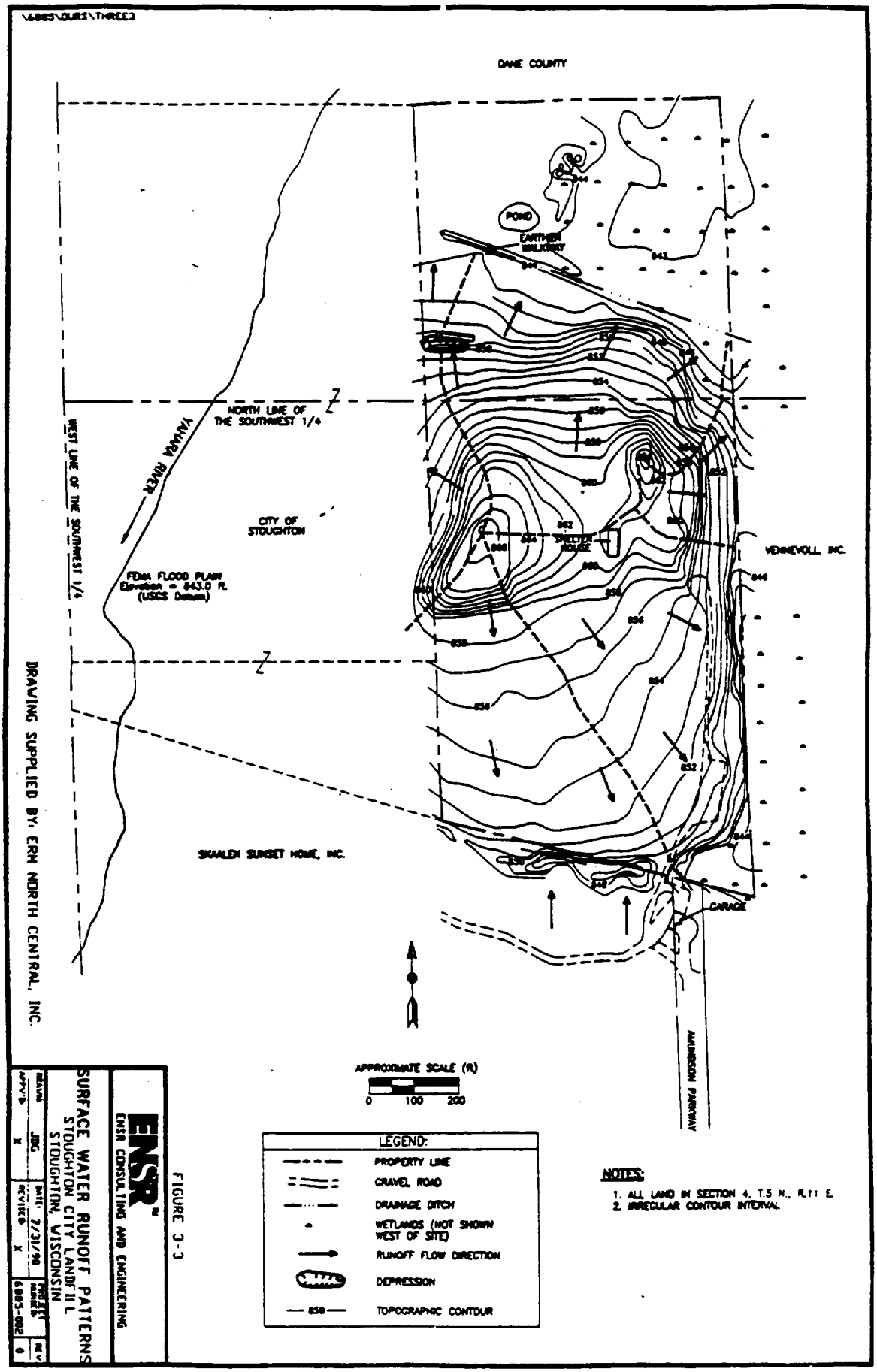
374+00
373+00
372+00
122+00
122+50
123+00
123+50
124+00
124+50
125+00
125+50
126+00
126+50
127+00
127+50
128+00
128+50
129+00
APPROXIMATE SCALE (ft)
0
100
200
LEGEND:
PROPERTY LINE
GRAVEL ROAD
DRAINAGE DITCH
WETLANDS (NOT SHOWN WEST OF SITE)
SB-1 PREEXISTING MONITORING WELL
P-2 PIEZOMETER
C-3 SURFACE WATER STAFF GAGE
MW-1 MONITORING WELL CLUSTER
LANDFILL BOUNDARY (BASED ON RESULTS OF DRILLING AND GEOPHYSICAL SURVEYS)
850 LINE OF EQUAL WATER LEVEL ELEVATION (DASHED WHERE APPROXIMATE)
858 TOPOGRAPHIC CONTOUR
NOTES:
1. ALL LAND IN SECTION 4, T 5 N, R 11 E.
2. IRREGULAR WATER LEVEL CONTOUR INTERVAL
3. TOPOGRAPHIC CONTOUR INTERVAL OF 2 FEET
4. ALL ELEVATIONS IN FEET AMSL
DIRECTION OF GROUNDWATER
DRAWING SUPPLIED BY: ERM NORTH CENTRAL, INC.
ENSR CONSULTING AND ENGINEERING
WATER TABLE MAP
APRIL 13, 1989
STOUGHTON CITY LANDFILL
STOUGHTON, WISCONSIN
DRAWN JDG
APPVD X
DATE 7/31/90
REVISED X
PROJECT NUMBER 6685-002
REV 0

FIGURE 3-6



DRAWING SUPPLIED BY: ERM NORTH CENTRAL, INC.

FIGURE 3-3

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SURFACE WATER RUNOFF PATTERNS
STOUGHTON CITY LANDFILL
STOUGHTON, WISCONSIN

APP'D	JBG
X	
REVISED	DATE: 7/31/90
X	
PROJECT NUMBER	REV
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II. SITE HISTORY

The City of Stoughton purchased the original 40-acre Site in July 1952, and annexed it in September 1952, when landfill operation began at the Site. Between 1952 and 1969, the Site was operated as an uncontrolled dump Site. During this time, refuse was usually burned or covered by dirt. In 1969, the Site began operation as a State-licensed landfill. In 1977, the Wisconsin Department of Natural Resources (WDNR) required that the Site be closed according to State regulations. Closure activities included construction of a trash transfer station, placement of cover material borrowed from the northwest portion of the Site and from agricultural areas, application of topsoil also derived from an agricultural area, and seeding. From 1978 to 1982 only brick, rubble, and similar construction materials were accepted at the Site while closure work was performed. The landfill was officially closed in 1982.

Common municipal waste and both dry and liquid wastes were disposed at the Stoughton City Landfill. Dry waste included sludge materials, empty rejected metal spray containers (used for storing multi-purpose lubricants), and used appliances. Some sludge materials containing 2-butanone, acetone, tetrahydrofuran, toluene, and xylene mixtures, were disposed at the Site from 1954 until 1962. During this period, the liquid wastes were commonly poured over garbage and burned. It was also reported that some liquid wastes were poured down holes drilled to test auger drilling equipment in the west-central portion of the landfill.

The Stoughton City Landfill is currently an inactive facility. Vehicular access to the Site is controlled by a set of gates that are kept locked at all times. In addition, snow-fencing was installed along the southern property boundary upon initiation of the RI. Warning signs were placed along the snow-fencing and on signposts installed on the west, north, and east property boundaries.

The Site was placed on the National Priorities List (NPL) in June 1986. In March 1988, Uniroyal Plastics, Inc. and the City of Stoughton (the Potentially Responsible Parties or PRPs) entered into an Administrative Order by Consent ("AOC" or "the Order") with U.S. EPA and WDNR for the conduct of a Remedial Investigation and Feasibility Study (RI/FS). ERM - North Central was originally contracted by the PRP's to conduct all work related to the RI/FS. ERM was replaced by ENSR Consulting and Engineering in 1990 to complete all remaining tasks of the RI/FS.

RI field activities began in March 1989. The first round of groundwater monitoring occurred in May and June 1989. Routine analyses were run for Target Compound List (TCL) inorganics and organics as well as for non-standard volatile organics, tetrahydrofuran (THF), trichloroflouromethane and dichlorodiflouromethane. A second round of groundwater sampling

occurred in May and June 1990. At that time, background surface water and sediment samples were taken from the wetlands east of the Site and from the area between the Yahara River and western edge of the Site. The results of the RI field sampling are summarized in Table 5-1.

An ecological Site assessment was conducted by U.S. EPA in May 1991. A preliminary ecological assessment was subsequently prepared in July 1991. The results of that preliminary assessment are as follows; "

> The wetlands surrounding the landfill are the main points of exposure for ecological receptors; they currently receive leachate discharge and in the past received surface water runoff from the landfill. Because the Site occurs in a relatively undeveloped area, a wide variety and number of terrestrial and aquatic organisms may be exposed to the Site contaminants. The wetlands and woods surrounding the Site provide excellent habitat for many species of birds, mammals, reptiles, amphibians, and invertebrates. Comparison of unfiltered surface water samples with criteria and other data indicate potential risks to aquatic life from Site-related contamination at SL-1 and SL-2, immediately adjacent to the southeast part of the landfill in leachate discharge areas, and possible risks to sediment-dwelling organisms at SL-1, SL-2, SL-7, and SL-8."

The preliminary report goes on to recommend that aquatic and whole-sediment toxicity tests and community surveys be conducted to assess the actual impact to organisms in the wetlands east of the Site. The report also states, "Remedial actions planned or suggested for the landfill that adequately control contaminated groundwater release from the Site should be sufficiently protective of aquatic biota."

Feasibility Study (FS) activities began in November 1989 with the submittal of the Alternatives Array Document. A draft FS was submitted on January 17, 1991. The Final FS was submitted to U.S. EPA and WDNR in June 1991. The Final FS was placed into the Site repository prior to the start of the public comment period. Attached to the FS were comments provided by U.S. EPA and WDNR which highlighted deficiencies with the document in the areas of presentation of current Site conditions, human health risks, risks to the environment, and rationale for remedy selection.

III. ENFORCEMENT HISTORY

U.S. EPA sent Information Request Letters pursuant to Section 104 of CERCLA on August 1, 1987 to the City of Stoughton, Uniroyal, Bjoin Transfer, IKI, and City Disposal. Based on the responses and other evidence, only Uniroyal, a generator and transporter, and the

Table 5-1 (page 1 of 4)

SUMMARY OF RESULTS OF WASTE AND ENVIRONMENTAL MEDIA SAMPLE ANALYSES
Stoughton City Landfill
Stoughton, Wisconsin

CHEMICAL	WASTE (ug/kg) (i.e., a MW2, MW6)		SOIL (ug/kg)		GW (ug/l)	
	Freq*	Detected Range	Freq	Detected Range	Freq	Detected Range
VOLATILE ORGANICS						
Benzene	1/6	2.0J				
2-butanone						
Chloroform	1/6	1.0J				
1,2-dichloroethene (cis and trans)					1/36	8.0
1,2-dichloroethene (trans only)						
Ethyl benzene						
Toluene						
Xylenes (total)					3/36	1.0J
Dichlorodifluoromethane					7/42	16J - 240J
Trichlorofluoromethane					6/42	6.4J - 24J
Tetrahydrofuran					6/44	27 - 660J
Tentatively identified compounds:						
Dichloromethane					1/30	38J
SEMIVOLATILE ORGANICS						
Benzoic acid					1/36	2.0J
Benzyl alcohol						
Bis(2-ethylhexyl)phthalate	4/6	95J - 600000J			3/36	2.0J - 44J
Butyl benzyl phthalate	1/6	230J				
Di-n-butyl phthalate	1/6	39J				
Di-n-octyl phthalate						
Acenapthene	1/6	72J				
Acenapthylene	1/6	88J				
2-methyl napthalene	1/6	52J				
Napthalene	1/6	180J				
Pentachlorophenol					1/36	3.0J
Anthracene	1/6	210J				
Benzo(a)anthracene	3/5	46J - 480				
Benzo(b)fluoranthene (coelutes w/ Benzo(k)fluoranthene)	4/6	120J - 730J				
Benzo(g,h,i)perylene	4/6	54J - 210J				
Benzo(a)pyrene	4/6	72J - 370J				
Chrysene	4/6	63J - 340J				
Dibenzo(a,h)anthracene	1/6	71J				
Fluoranthene	4/6	53J - 700				
Fluorene	1/6	160J				
Ideno(1,2,3-cd)pyrene	4/6	43J - 180J				
Phenanthrene	2/6	860 - 1800J				
Pyrene	2/6	61J - 570				
Tentatively identified compounds:						
Alkane	1/2	2160J	3/5	250J - 590J		
Carboxylic acids						
Polyaromatic hydrocarbon	2/2	260J - 4310J				
Unknown hydrocarbons					1/30	340J
Adipate						
Aldol condensates					1/30	2J
Benzene derivative	1/2	170J				
N-butyl benzene sulfonamide					1/30	14J
N,N-diethyl, 1,3-methylbenzamide					2/30	18J - 36J
1-(ethyloxy)pentane						
Phosphoric acid derivative	1/2	17,610J				
Phthalate esters	1/2	4,910J				
Sulfur molecule	1/2	450J				
Vitamin E						
PESTICIDES/PCBs						
4,4'-DDD	1/6	270				

Table 5-1 (page 2 of 4)

SUMMARY OF RESULTS OF WASTE AND ENVIRONMENTAL MEDIA SAMPLE ANSLYSES
Stoughton City Landfill
Stoughton, Wisconsin

CHEMICAL	SW (ug/l)		SEDIMENT (ug/kg)		AIR (ppm)	
	Freq	Detected Range	Freq	Detected Range	Freq	Detected Range
VOLATILE ORGANICS						
Benzene			1/9	8.0J		
2-butanone						
Chloroform					1/7	0.06
1,2-dichloroethene (cis and trans)					1/7	0.02
1,2-dichloroethene (trans only)					1/7	0.04
Ethyl benzene					1/7	0.08
Toluene						
Xylenes (total)	2/16	1.5J - 3				
Dichlorodifluoromethane						
Trichlorofluoromethane						
Tetrahydrofuran						
Tentatively identified compounds:						
Dichloromethane						
SEMIVOLATILE ORGANICS						
Benzoic acid			3/9	100J - 2800J(b)		
Benzyl alcohol			1/9	170J		
Bis(2-ethylhexyl)phthalate			7/9	68J - 590J(b)		
Butyl benzyl phthalate						
Di-n-butyl phthalate			1/9	58J		
Di-n-octyl phthalate						
Acenapthene						
Acenapthylene						
2-methyl napthalene						
Napthalene						
Pentachlorophenol						
Anthracene						
Benzo(a)anthracene			1/9	64J		
Benzo(b)fluoranthene (coelutes w/ Benzo(k)fluoranthene)						
Benzo(g,h,i)perylene			1/9	66J		
Benzo(a)pyrene						
Chrysene			1/9	110J		
Dibenzo(a,h)anthracene						
Fluoranthene						
Fluorene			1/9	69J		
Ideno(1,2,3-cd)pyrene			2/9	72J - 82J		
Phenanthrene						
Pyrene						
Tentatively identified compounds:						
Alkene			7/9	580J - 9300J		
Carboxylic acids	1/7	54J	1/9	10600J(b)		
Polyaromatic hydrocarbon			1/9	1300J		
Unknown hydrocarbons			8/9	3880J - 67130J(b)		
Adipate			1/9	470J		
Aldol condensates						
Benzene derivative						
N-butyl benzene sufflonamide						
N,N,-diethyl,1,3-methyl benzamide			1/9	360J		
1-(ethyloxy)pentane						
Phosphoric acid derivative						
Phthalate esters			1/9	3,900J		
Sulfur molecule			3/9	970J - 4,100J		
Vitamin E						
PESTICIDES/PCBs						
4,4'-DDD						

Table 5-1 (page 3 of 4)

SUMMARY OF RESULTS OF WASTE AND ENVIRONMENTAL MEDIA SAMPLE ANALYSES
Stoughton City Landfill
Stoughton, Wisconsin

CHEMICAL	WASTE (mg/kg) [B] (i.e., B MW2, MW6)		SOIL (mg/kg) [B]		GW (ug/l) [B]	
	Freq	Detected Range	Freq	Detected Range	Freq	Detected Range
INORGANICS						
Aluminum					1/15	131J
Antimony	1/2	15.8J			2/15	33.2J - 33.6J
Arsenic					6/15	1.4J - 5.2J
Barium					3/15	352 - 391
Beryllium	1/2	0.37J				
Cadmium	1/2	27				
Chromium	1/2	40J			1/15	8J
Cobalt						
Copper						
Lead	1/2	460J			1/15	3.6J
Manganese					5/15	873 - 2330
Mercury	1/2	0.62				
Nickel					2/15	19.6J - 20.1J
Selenium					1/5	7.4J
Vanadium						
Zinc						
Calcium	1/2	35,200J	3/7	68,400 - 108,552	3/15	167,000 - 175,000
Magnesium			3/7	38,400 - 39,922	3/15	79,300 - 83,400
Potassium			1/7	611	12/15	17,200 - 156,000
Iron						

Table 5-1 (page 4 of 4)

SUMMARY OF RESULTS OF WASTE AND
ENVIRONMENTAL MEDIA SAMPLE ANALYSES
Stoughton City Landfill
Stoughton, Wisconsin

CHEMICAL	SW (ug/l) [B]		SEDIMENT (mg/kg) [B]	
	Freq	Detected Range	Freq	Detected Range
INORGANICS				
Aluminum	6/7	162J - 12,600		
Antimony				
Arsenic	7/7	2.8J - 7.3J		
Barium	4/7	294 - 457		
Beryllium				
Cadmium			4/9	1.6J - 23.3J
Chromium	4/7	6.8J - 16.5		
Cobalt	4/7	5.1J - 16.3J		
Copper	1/7	33.9		
Lead	4/7	15.2J - 68.6J	1/9	172J
Manganese	5/7	792J - 4,480	1/9	746J
Mercury				
Nickel	2/7	42.3J - 51.2J		
Selenium				
Vanadium	4/7	23.3J - 54.2		
Zinc	4/7	127J - 327J		
Calcium	3/7	134,000 - 154,000		
Magnesium	2/7	123,000 - 125,000		
Sodium				
Potassium	7/7	5,440 - 49,100		
Iron	5/7	5,530 - 46,600J		

NOTES: *Frequency based on number of detections for investigative, field duplicate, matrix spike, and matrix spike duplicate sample analyses. Samples not analyzed (NA), flagged as R, or background samples were not included in the frequency determination.

Frequency based on number of detections above quantitation limits for all sampling rounds. Chemicals based on investigative field replicate, matrix spike, and matrix spike duplicate sample analyses.

J - Indicates an estimated value

[B] denotes that values were compared to background; only those in excess of twice background are presented as detections.

(b) denotes compound was also detected in background samples.

City of Stoughton, the owner/operator, were issued special notice under Section 122 of CERCLA for the RI/FS. No further evidence has been discovered which would indicate that anyone other than these two entities should be sent special notice letters (SNL's) for RD/RA.

On March 29, 1988 and April 15, 1988, the Secretary of the WDNR and Director of U.S. EPA Region V's Waste Management Division, respectively, signed a CERCLA 106 Administrative Order by Consent with Uniroyal and the City of Stoughton stipulating the undertaking of a Remedial Investigation and Feasibility Study (RI/FS) for the purposes of determining the nature and extent of the threat to the public health or welfare or the environment due to the release or threatened release of hazardous substances or contaminants from the Site and to evaluate appropriate remedial action alternatives to prevent or mitigate the migration or release of hazardous substances or contaminants from the Site.

The signed Order underwent a mandatory 30 day public comment period shortly thereafter. No comments were received during public comment and the Order became effective on May 2, 1988.

IV. COMMUNITY PARTICIPATION

Pursuant to Sections 113(k)(2)(b)(i-v) and 117 of CERCLA, the Stoughton community has participated in the remedy selection process, in that:

* Prior to any public meeting, a press release was sent out to the local media and an advertisement announcing the meeting was placed in the Stoughton Hub Courier, a local paper of general circulation;

* A public meeting ("kick-off") was held in November 1988, announcing the scope of the RI/FS;

* The three Site information repositories have been kept up to date with Site documents. An administrative record containing the RI and FS reports and other documents was placed in a Site repository at the Stoughton Public Library.

* A Proposed Plan for remedial action was released for public comment and placed into the Administrative Record on July 12, 1991 with the 30-day comment period ending August 12, 1991. A Notice of Availability of the Proposed Plan was published in the Stoughton Hub Courier prior to the release of the Proposed Plan;

* A public meeting was held on July 24, 1991, in the Site proximity, at which the U.S. EPA and the WDNR presented the Proposed Plan, as well as the findings of the RI/FS to the

community and received oral comments (which are addressed in the attached Responsiveness Summary). A transcript was kept of the public meeting and placed in the administrative record and Site repositories;

* The U.S. EPA has received written comments regarding the Proposed Plan which are addressed in the Responsiveness summary.

V. SCOPE AND ROLE OF REMEDIAL ACTIVITIES

Due to the complexity of the environmental setting and the potential for the primary contaminant, tetrahydrofuran (THF), to move throughout the aquifer, the response action will focus on controlling the source of contamination (i.e., the landfill contents), extracting and treating the contaminated groundwater unless U.S. EPA determines after further investigation it is not necessary to meet clean-up goals, and protecting the adjacent wetlands by reducing the leaching of iron and other metals into them.

The landfilled waste is classified as a low level threat waste, which will be contained on Site. Treatment of the landfill contents is inappropriate because of the size of the landfill and the absence of known "hot spots" (i.e., areas of concentrated hazardous substances) that represent a principal threat. Contaminated groundwater will be treated prior to discharge to the Yahara River, unless further investigative work indicates that groundwater extraction and treatment will not be necessary.

The goal of the Superfund remedy selection process is to select remedies that are protective of human health and the environment, that maintain protection over time, and that minimize untreated waste. The Site-specific clean-up goals for the SCL Site are:

* To minimize direct contact with the wastes;

* To minimize the further movement of contaminants to groundwater by reducing the amount of precipitation which infiltrates the landfill;

* To contain the movement of contaminants in the groundwater in order to prevent contaminants from leaving the Site boundary;

* To extract and treat groundwater to meet State water quality discharge limits;

* To restore the groundwater to State groundwater quality standards.

A total of eight remedial alternatives, including the No Action Alternative, were developed for the final version of the FS.

These alternatives were screened and compared to each other and evaluated with respect to the Nine Evaluation Criteria set forth in the NCP. The Proposed Plan presented an evaluation of nine alternatives, which included U.S. EPA's preferred remedy. This decision document reflects the Agency's selected alternative which is the preferred remedy identified in the Proposed Plan with a contingency regarding the groundwater component of the remedy (see Section IX of this ROD).

VI. SUMMARY OF SITE CHARACTERISTICS

The boundaries of the landfill were defined using geophysical surveys and information obtained from a review of historical aerial photographs. The south boundary was modified based on drilling performed later in the RI. Figure 1-4 shows the landfill boundary defined as part of the RI. An estimated 218,000 cubic yards of waste are in place at the landfill.

A variety of VOCs were measured in the soil gas survey conducted across the landfill. Dichlorodifluoromethane was detected at greatest concentrations and was most widely distributed across the landfill. Other VOCs, including trans-1,2-dichloroethene, trichloroethene, toluene, tetrahydrofuran, benzene, and total xylenes, were also detected. Many of these constituents were concentrated in the west-central portion of the landfill; however, high concentrations of the various compounds were localized in other areas across the landfill.

Refuse was apparently initially deposited in wetlands in the southeast portion of the Site, and then later in the extreme north portion of the landfill. In the southeast area, the refuse is saturated to a maximum thickness of approximately 5 feet. The degree of refuse saturation is less in the north portion of the Site.

The landfill was closed in 1982 according to then applicable State regulations. Closure activities included the placement of cover material. Cover materials encountered during well installation and the soil gas survey were clay or silty clay; however, a detailed cap study was not conducted as part of the RI. In general, the condition of the cover material appears to be sound. An exception to this is along a small portion of the east landfill boundary where animal holes exist. Some metallic waste is visible in these animal holes.

A total of three rounds of groundwater sampling and analysis were performed at monitoring well locations shown on Figure 1-8; however, metals were determined only for one sampling round (Round 1) and Target Compound List (TCL) organics for two sampling rounds (Rounds 1 and 2). All monitoring wells are screened in sand and gravel deposits with the exception of MW-2S

which is screened in refuse and lacustrine plain sediments (silty and sandy clay). The presence of potential contamination in the bedrock aquifer was not previously evaluated as part of the RI. Such an evaluation will take place during the additional work activities.

Results of the RI indicated that groundwater to the west of the Site is contaminated with tetrahydrofuan (THF) in concentrations which exceed the State Enforcement Standard by more than one order of magnitude (660 µg/l vs. 50 µg/l). Limited sampling and analyses were conducted on the waste itself, and the results did indicate the presence of polynuclear aromatic hydrocarbons (PAH's) and pthalates. PAH's were found within several times the Contract Required Quantification Limit (CRQL) for a variety of compounds. Bis(2-ethylhexyl) phthalate, (BEHP), was detected in waste in concentrations as high as 600,000 µg/kg. Sediments in the eastern wetlands were found to contain elevated levels of aluminum, calcium and magnesium. PAH's, phthalates, benzoic acid, cadmium and lead were found in low concentrations in sediment samples taken from the wetlands southeast of the Site.

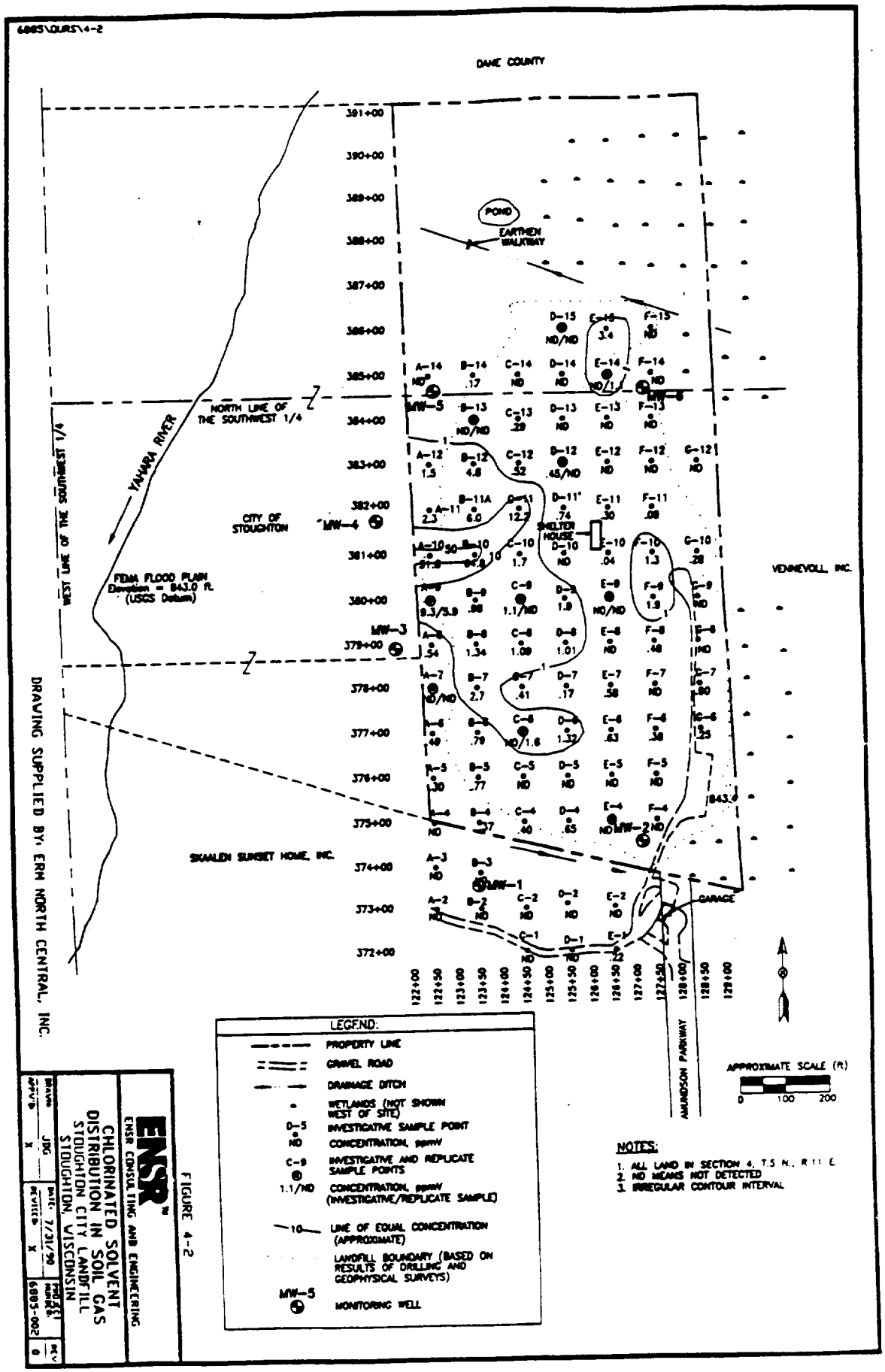
Tetrahydrofuran was measured at MW-3D at concentrations above the Wisconsin enforcement standard (50 µg/L) during all three sampling rounds. Tetrahydrofuran was also measured in one sampling round at MW-4D and MW-5S above the Wisconsin preventive action limit (PAL) concentration (10 µg/L). There are presently no Federal drinking water standards for THF.

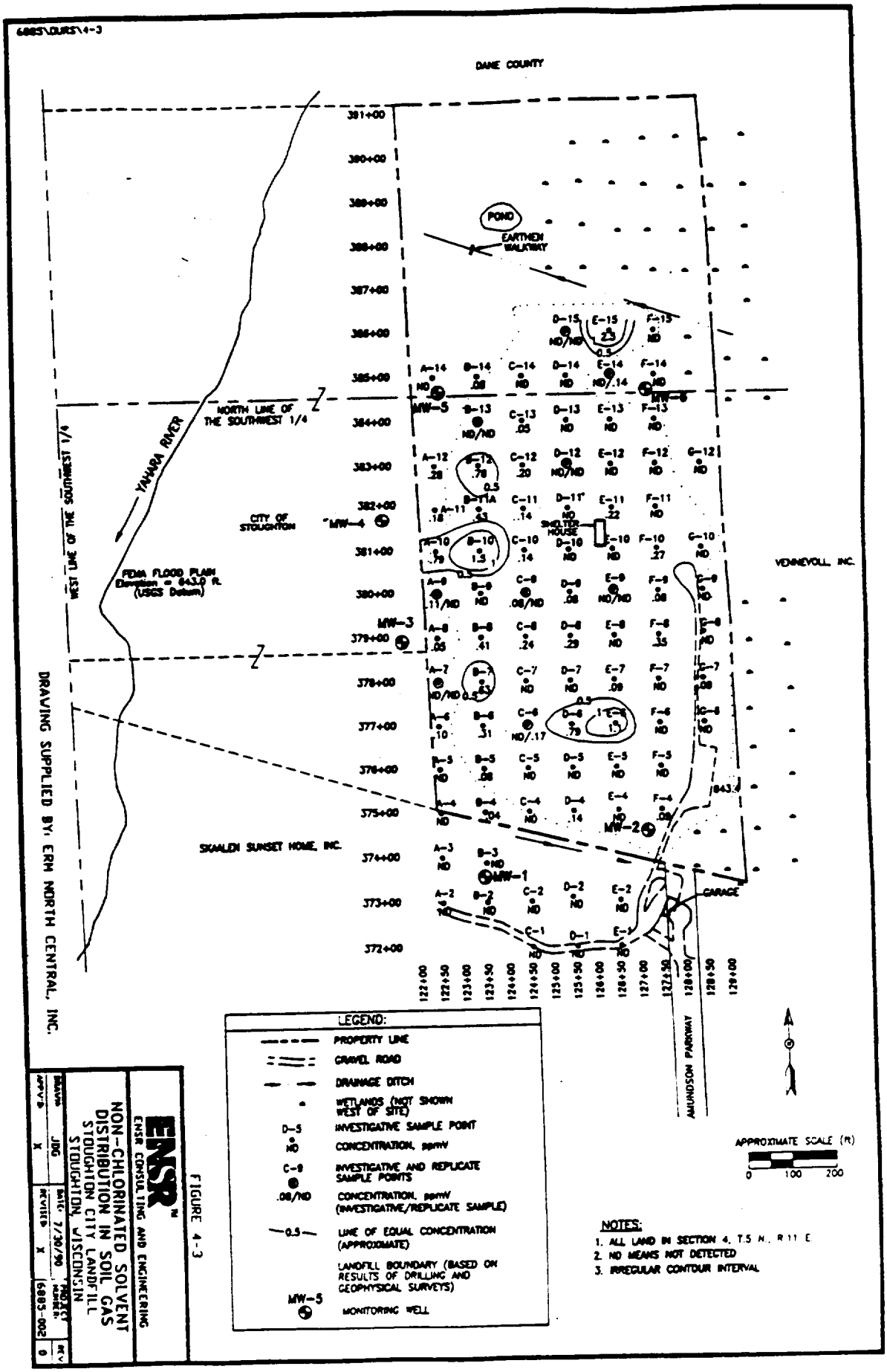
Trichlorofluoromethane was measured in MW-5S and MW-5D during all sampling rounds at concentrations below the Wisconsin PAL (698 µg/L).

Dichlorodifluoromethane was detected in MW-3D, MW-5S, and MW-5D in concentrations from 16 µg/L to 240 µg/L during some sampling rounds. No Federal groundwater standards exist for dichlorodifluoromethane. The State does have an interim recommended PAL of 300 µg/L for this compound.

Bis(2-ethylhexyl)phthalate was measured during some sampling rounds at MW-3D and MW-4D at low concentrations. Pentachlorophenol and benzoic acid were detected at very low concentrations in MW-6S and MW-6D, respectively, during one sampling round.

Elevated concentrations of metals were detected in various shallow and deep monitoring wells located in all directions away from the Site, excluding the northeast direction. The concentration of arsenic (5.2 µg/L) was marginally above the PAL of 5 µg/L in MW-2S in one replicate sample. The highest concentration of barium in MW-2S (293 µg/L) was also above the PAL of 200 µg/L. The hydraulic gradient is vertically upward at MW-2S and MW-2D, toward the adjacent wetlands. The concentration


6885\OURS\4-2
DANE COUNTY
POND
EARTHEN WALKWAY
NORTH LINE OF THE SOUTHWEST 1/4
WEST LINE OF THE SOUTHWEST 1/4
YAHARA RIVER
CITY OF STOUGHTON
MW-4
MW-5
MW-3
MW-2
MW-1
FEMA FLOOD PLAIN
Elevation = 843.0 ft.
(USGS Datum)
SHELTER HOUSE
SKAALEN SUNSET HOME, INC.
VENNEVOLL, INC.
GARAGE
AMUNDSON PARKWAY
391+00
390+00
389+00
388+00
387+00
386+00
385+00
384+00
383+00
382+00
381+00
380+00
379+00
378+00
377+00
376+00
375+00
374+00
373+00
372+00
122+00
122+50
123+00
123+50
124+00
124+50
125+00
125+50
126+00
126+50
127+00
127+50
128+00
128+50
129+00
843.0
APPROXIMATE SCALE (ft)
0
100
200
LEGEND:
PROPERTY LINE
GRAVEL ROAD
DRAINAGE DITCH
WETLANDS (NOT SHOWN WEST OF SITE)
D-5 INVESTIGATIVE SAMPLE POINT
ND CONCENTRATION, ppmV
C-9 INVESTIGATIVE AND REPLICATE SAMPLE POINTS
1.1/ND CONCENTRATION, ppmV (INVESTIGATIVE/REPLICATE SAMPLE)
10 LINE OF EQUAL CONCENTRATION (APPROXIMATE)
LANDFILL BOUNDARY (BASED ON RESULTS OF DRILLING AND GEOPHYSICAL SURVEYS)
MW-5 MONITORING WELL
NOTES:
1. ALL LAND IN SECTION 4, T.5 N., R.11 E.
2. ND MEANS NOT DETECTED
3. IRREGULAR CONTOUR INTERVAL
DRAWING SUPPLIED BY: ERM NORTH CENTRAL, INC.
ENSR CONSULTING AND ENGINEERING
CHLORINATED SOLVENT DISTRIBUTION IN SOIL GAS
STOUGHTON CITY LANDFILL
STOUGHTON, WISCONSIN
DRAWN JDG
DATE 7/31/90
PROJECT NUMBER 6885-002
REV 0
FIGURE 4-2



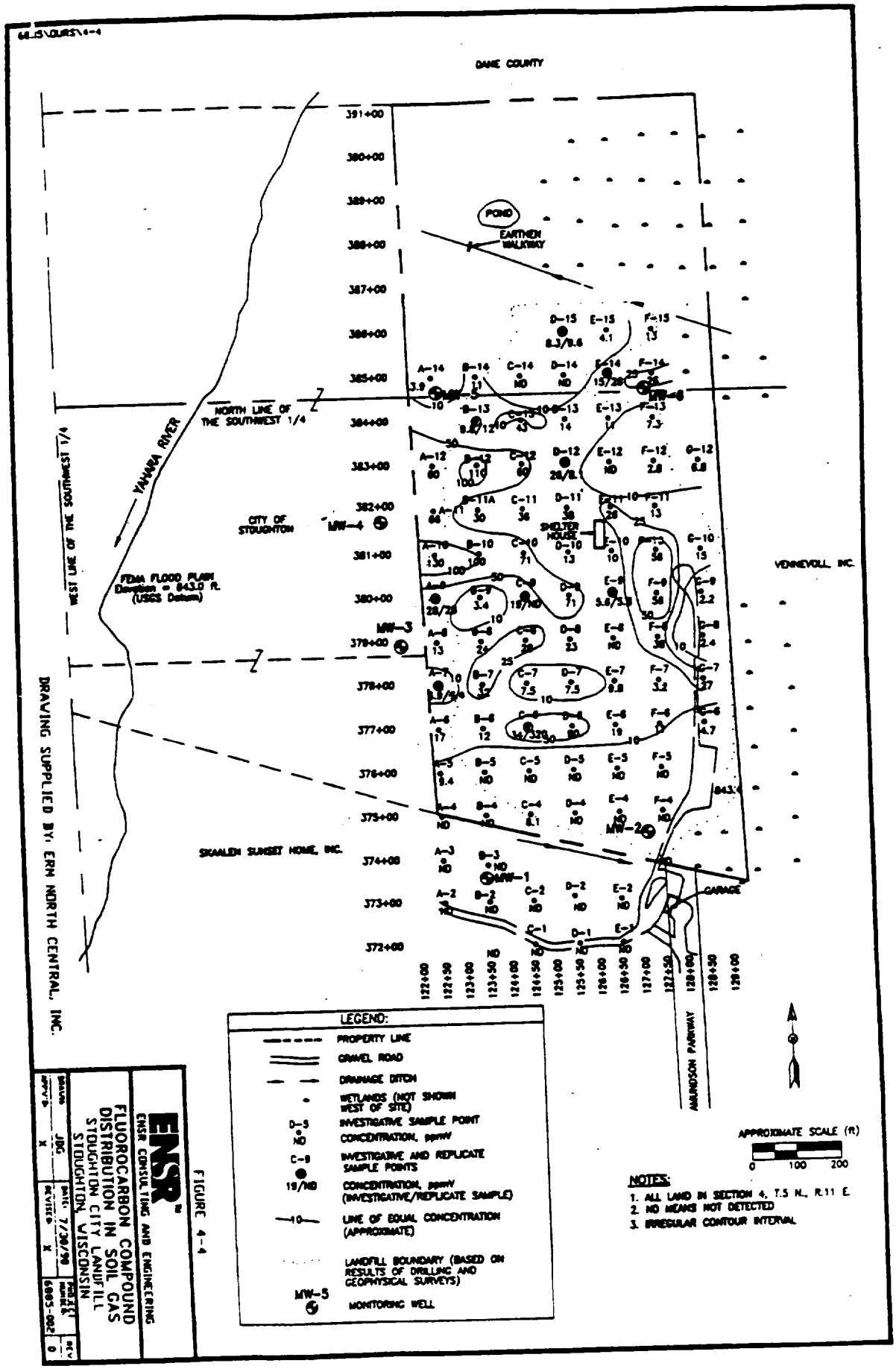
ENSR CONSULTING AND ENGINEERING

NON-CHLORINATED SOLVENT DISTRIBUTION IN SOIL GAS
STOUGHTON CITY LANDFILL
STOUGHTON, WISCONSIN

DRAWN	DATE	PROJECT NUMBER	REV.
JDG	7/30/96	6985-002	0

APP'D. X REVISED X

FIGURE 4-3


DANE COUNTY
POND
EARTHEN WALKWAY
NORTH LINE OF THE SOUTHWEST 1/4
WEST LINE OF THE SOUTHWEST 1/4
YAHARA RIVER
CITY OF STOUGHTON
MW-4
MW-3
MW-2
MW-1
FEMA FLOOD PLAIN Elevation = 843.0 ft. (USGS Datum)
SKAALEN SUNSET HOME, INC.
SHELTER HOUSE
GARAGE
VENNEVOLL INC.
AMUNDSON PARKWAY
843
391+00
390+00
389+00
388+00
387+00
386+00
385+00
384+00
383+00
382+00
381+00
380+00
379+00
378+00
377+00
376+00
375+00
374+00
373+00
372+00
122+00
122+50
123+00
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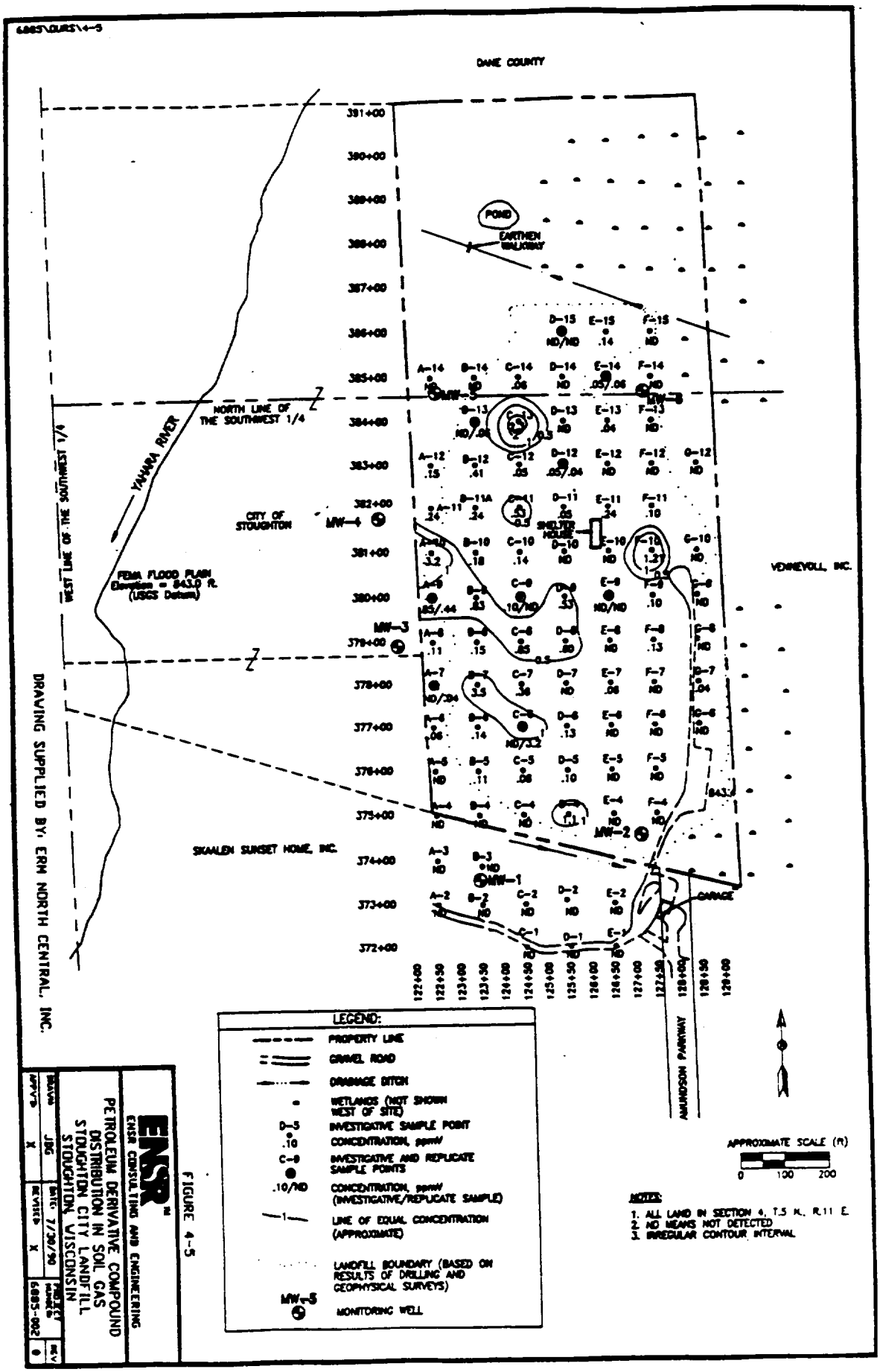
124+00
124+50
125+00
125+50
126+00
126+50
127+00
127+50
128+00
128+50
129+00
LEGEND:
PROPERTY LINE
GRAVEL ROAD
DRAINAGE DITCH
WETLANDS (NOT SHOWN WEST OF SITE)
D-5 ND INVESTIGATIVE SAMPLE POINT CONCENTRATION, ppmV
C-9 19/ND INVESTIGATIVE AND REPLICATE SAMPLE POINTS CONCENTRATION, ppmV (INVESTIGATIVE/REPLICATE SAMPLE)
-10- LINE OF EQUAL CONCENTRATION (APPROXIMATE)
LANDFILL BOUNDARY (BASED ON RESULTS OF DRILLING AND GEOPHYSICAL SURVEYS)
MW-5 MONITORING WELL
APPROXIMATE SCALE (ft)
0 100 200
NOTES:
1. ALL LAND IN SECTION 4, T.5 N., R.11 E.
2. ND MEANS NOT DETECTED
3. IRREGULAR CONTOUR INTERVAL
DRAWING SUPPLIED BY: ERM NORTH CENTRAL, INC.
ENSR CONSULTING AND ENGINEERING
FLUOROCARBON COMPOUND DISTRIBUTION IN SOIL GAS
STOUGHTON CITY LANDFILL
STOUGHTON, WISCONSIN
DATE: 7/30/98
PROJECT NO. 0805-002
REV. 0

FIGURE 4-4



ENSR CONSULTING AND ENGINEERING

PETROLEUM DERIVATIVE COMPOUND DISTRIBUTION IN SOIL GAS
STOUGHTON CITY LANDFILL
STOUGHTON, WISCONSIN

DRAWN	DATE	PROJECT MANAGER	REV
APP'D	7/30/90	6885-002	0
JDG			
X	X		

FIGURE 4-5

of barium was above the PAL at MW-1S; however, this concentration was not significantly above background. Selenium was detected above the PAL in upgradient well MW-1S. Chromium was measured in MW-4D below the limit of quantification but above the PAL. Concentrations of the following constituents were above the Wisconsin groundwater quality standards: iron (in MW-2S, MW-3S, MW-4D, and MW-5D) and manganese (all, including the background well). Iron was also above the standard in the private well sampled for background purposes. These public welfare standards are not health related, but rather are for aesthetics (e.g., color and fixture staining).

In the wetlands east of the Site, zinc, lead, copper and iron are present in concentrations which exceed the State chronic toxicity criteria for surface water.

Soil gas survey results indicated the presence of low level volatile organics. (Figures 4-2 to 4-5).

Four VOCs were detected at low concentrations at one ambient air sampling point located just north of MW-2 (see Figures 4-7 and 4-8). These VOCs were not detected in a replicate sample at this location. The VOCs detected and their respective concentrations in parts per million (ppm) were: 1,2-Dichloroethene (0.06 ppm); ethyl benzene (0.02 ppm); xylene (0.08 ppm); and toluene (0.04 ppm).

Groundwater flow in the surficial aquifer is radial beneath the Site. Regional groundwater flow is west toward the Yahara River. Groundwater flow in the bedrock aquifer is toward the west.

VII. SUMMARY OF HUMAN HEALTH RISKS

Pursuant to the NCP, a baseline risk assessment was performed based on unaltered conditions at the Site, as contemplated by the no-action alternative. The no-action alternative assumes that no corrective action will take place and that no Site use restrictions, such as fencing, zoning, and drinking water restrictions, will be imposed. The risk assessment then determines actual or potential risks or toxic effects the chemical contaminants at the Site pose under current and feasible future land-use assumptions. The risk assessment was approved by U.S. EPA, in consultation with WDNR. Subsequent to this approval it was determined that the reference dose (RfD) for THF as used in the BRA was incorrect, thereby resulting in under-calculated Site risks. The risks were subsequently recalculated using the RfD as provided by the Environmental Criteria and Assessment Office (ECAO), which is 0.002 mg/kg-day (versus the 0.068 mg/kg-day RfD used in the original risk assessment). The revised risk calculations included the following assumptions:

* No remedial actions will be taken;

* Adjacent off-Site development may occur in the future; and,

* Groundwater contaminant concentrations will not decrease over time and the future residential scenario would involve the consumption of contaminated water from MW-3D (where the highest concentrations of THF were detected) over an adult lifetime.

An assessment of the health risks associated with target compounds identified in the RI was carried out and presented in the risk assessment, which was submitted in final form in June 1991. Various exposure scenarios were evaluated. The maximum carcinogenic risks from the Site (considered for both the single, worst-case well approach and reasonable maximum risk associated with the 95% upper confidence level [UCL]) were within the Agency allowable risk range. The highest total Site risk for the worst well approach was 9.7E-05. The cumulative lifetime adult hazard index was determined to be 1.4, of which 1.2 was as a result of inhalation of volatile organic compounds in the air above the Site. Because of an error in the ingestion reference dose used for THF, the final baseline risk assessment submitted by the PRPs underestimated potential non-carcinogenic Site risks.

The Hazard Index, an expression of non-carcinogenic toxic effects, measures whether a person is being exposed to adverse levels of non-carcinogens. Any hazard index value greater than 1 suggests that a non-carcinogen potentially presents an unacceptable toxic effect.

Based on the risk assumptions and routes of exposure, ingestion of the waste, direct skin contact and ingestion of contaminants in the surface water and sediment, direct skin contact with and ingestion of contaminated soil, drinking contaminated groundwater at the landfill, and breathing air at the landfill), the contaminants at the Stoughton City Landfill could result in unacceptable non-carcinogenic risks such as impaired organ function in both adults and children.

Using the correct reference dose for THF, the maximum cumulative non-carcinogenic risk was determined by U.S. EPA to be 9.5 (adult HI), which is outside the acceptable range for non-carcinogenic risk. These risks were based on future residential land use scenarios within close proximity to the Site and on future groundwater use at the Site. In addition to being outside of U.S. EPA's acceptable risk range, there are also chemical-specific Applicable or relevant and appropriate requirement (ARAR) exceedances at the Site.

Toxic substances may pose certain types of hazards to human and/or animal populations. Typically, hazards to human health

are expressed as carcinogenic risks and non-carcinogenic toxic effects. Carcinogenic risk, numerically presented as an exponential factor (e.g., 1×10^{-6}), is the increased chance a person may have in contracting cancer in his or her lifetime due to exposure to a Chemical of Concern over his or her lifetime. For example, a 1×10^{-6} risk due to a lifetime of drinking water with a Chemical of Concern in it means that the a person's chance of contracting cancer due to drinking the water over his/her lifetime is increased by 1 in 1 million. U.S. EPA considers risks at Superfund Sites in excess of 1×10^{-4} to be unacceptable.

Under current conditions, the group most likely to come into contact with Site contaminants would be individuals involved in recreational activities in the wetlands. These individuals could be exposed to contaminants in the surface water and sediment through direct skin contact and ingestion. The estimates of potential risk were based on the following scenarios. Adults were assumed to be extensively exposed to the contamination for four days annually for 30 years. Children were assumed to be extensively exposed for seven days annually for five years. Children are especially vulnerable to contaminated soil and water for several reasons. They spend more time outside playing, and they are more likely to put dirty objects or fingers in their mouths, thereby ingesting contaminated soil. Their bodies are still developing, and because of their lower body weight, a smaller amount of contamination can have an effect.

Direct skin contact with sediment could cause a potential increase in the risk of cancer of four potential additional cases of cancer in every one million people exposed. Ingesting sediment and direct skin contact with surface water on Site would not pose an unacceptable risk to exposed individuals.

If people were to be involved in recreational activities at the landfill, they could potentially be exposed to Site contaminants through ingestion of or direct skin contact with the waste and contaminated soil, and breathing contaminated air at the landfill. However, the risks from such exposure is less than U.S. EPA's level of concern.

Additionally, if people were to drink the contaminated groundwater at the landfill, the potential increase in the risk of cancer posed would amount to eight additional cases of cancer in every 100,000 people exposed.

The highest cancer risk at the Stoughton City Landfill Site is eight potential additional cases of cancer in 100,000 people exposed to it. Therefore, the lifetime cancer risks associated with the SCL Site are not considered unacceptable.

STOUGHTON LANDFILL
SUMMARY OF REVISED RISK CALCULATIONS STO-SUMS.WK1

EXPOSURE ROUTE	Adult Hazard Index	Child Hazard Index	Lifetime Cancer Risk	
SURFACE WATER				
Ingestion	NE	NE	NE	
Dermal Exposure	4.8E-06	1.4E-05	2.6E-11	
SEDIMENT				
Ingestion	4.6E-04	7.0E-03	7.4E-08	
Dermal Exposure	1.2E-02	1.3E-01	2.2E-07	
WASTE				
Ingestion	1.4E-06	2.1E-05	9.7E-08	
Dermal Exposure	8.7E-06	5.4E-05	2.9E-07	
SOIL				
Ingestion	2.0E-08	3.0E-07		
Dermal Exposure	5.4E-07	5.6E-06		
AIR				
Inhalation	1.6E+00	4.8E+00		PRP
Inhalation	9.9E-01	3.1E+00		EPA
SUBTOTAL				
Ingestion	4.6E-04	7.0E-03	1.7E-07	
Dermal Exposure	1.2E-02	1.3E-01	5.1E-07	
Inhalation	1.6E+00	4.8E+00		PRP
Inhalation	9.9E-01	3.1E+00		EPA
GROUNDWATER				
RME (95% UCL)				
Ingestion				
W	1.8E+00	3.0E+00	7.9E-05	PRP
NE	5.3E-02	8.6E-02		PRP
SE	7.7E-02	1.3E-01	7.4E-05	PRP
Dermal				
W	3.0E-03	4.3E-03	2.0E-09	PRP
NE	4.5E-02	6.5E-02		PRP
SE	1.4E-06	2.0E-06	1.3E-09	PRP
MAX @ INDIVIDUAL WELLS				
Ingestion				
W @ MW-3D	9.5E+00	1.5E+01	3.9E-05	EPA
NE @ MW-5S	5.3E-02	8.5E-02		EPA
SE @ MW-2S	1.3E-01	2.1E-01	9.7E-05	EPA
Dermal				
W @ MW-3D	6.2E-04	1.0E-03	7.2E-11	EPA
NE @ MW-5S	1.7E-03	2.7E-03		EPA
SE @ MW-2S	8.5E-08	1.4E-07	6.2E-11	EPA

STOUGHTON LANDFILL
SUMMARY OF REVISED RISK CALCULATIONS STO-SUMS.WK1

EXPOSURE ROUTE	Adult Hazard Index	Child Hazard Index	Lifetime Cancer Risk	
SUBTOTAL INCLUDING GW				
RME (95% UCL)				
Ingestion				
W	1.8E+00	3.0E+00	7.9E-05	PRP
NE	5.3E-02	9.3E-02	1.7E-07	PRP
SE	7.8E-02	1.3E-01	7.4E-05	PRP
Dermal				
W	3.4E-03	1.1E-02	1.7E-07	PRP
NE	4.5E-02	7.2E-02	1.7E-07	PRP
SE	4.6E-04	7.0E-03	1.7E-07	PRP
Inhalation	1.6E+00	4.8E+00		PRP
MAX @ INDIVIDUAL WELLS				
Ingestion				
W @ MW-3D	9.5E+00	1.5E+01	3.9E-05	EPA
NE @ MW-5S	5.3E-02	9.2E-02	1.7E-07	EPA
SE @ MW-2S	1.3E-01	2.2E-01	9.7E-05	EPA
Dermal				
W @ MW-3D	1.1E-03	8.0E-03	1.7E-07	EPA
NE @ MW-5S	2.2E-03	9.7E-03	1.7E-07	EPA
SE @ MW-2S	4.6E-04	7.0E-03	1.7E-07	EPA
Inhalation	9.9E-01	3.1E+00		EPA
TOTAL INCLUDING GW				
RME (95% UCL)				
Ing + Derm + Inh				
W	3.4E+00	7.8E+00	7.9E-05	PRP
NE	1.7E+00	4.9E+00	3.4E-07	PRP
SE	1.6E+00	4.9E+00	7.4E-05	PRP
MAX @ INDIVIDUAL WELLS				
Ing + Derm + Inh				
W @ MW-3D	1.0E+01	1.8E+01	3.9E-05	EPA
NE @ MW-5S	1.0E+00	3.2E+00	3.4E-07	EPA
SE @ MW-2S	1.1E+00	3.3E+00	9.7E-05	EPA
MAXIMUM RISK	1.0E+01	1.8E+01	9.7E-05	
minimum risk	1.0E+00	3.2E+00	3.4E-07	

NE = Not Evaluated

However, the Site does pose unacceptable non-cancerous risks, as groundwater ingestion from monitoring well 3-D over the course of an adult lifetime will result in a hazard index of 9.5.

For a summary of carcinogenic and non-carcinogenic Site risks, refer to Table STO-SUMS.WK1.

VIII. RATIONALE FOR ACTION

During the course of an RI/FS, the U.S. EPA requires that a risk assessment be prepared according to U.S. EPA policy and guidelines. For the SCL Site, PRP contractors prepared a Baseline Risk Assessment under the 1988 RI/FS Administrative Order. This risk assessment provides the Agency with a basis for taking a response action to protect human health and welfare, and the environment. The risk assessment which incorporated available Site information is consistent with U.S. EPA policy and guidance, although as noted above, some revision to the risk tables have been made by the Agency subsequent to the receipt and approval of the document. The risk assessment and revised risk calculations provide an estimate of the human health problems which could potentially result if contaminated groundwater is left untreated. As noted below, the Site does pose unacceptable non-carcinogenic risks to populations which may be exposed to THF in groundwater at the Site.

A. Risk Summary

Additive hazard indices exceed 1.0 in MW-3D, due to the presence of THF at high levels. The maximum worst-case well resulted in a lifetime HI of 9.5. Hazard indices above 1.0 are unacceptable.

Additive excess lifetime carcinogenic risks calculated for ingestion of contaminated groundwater were found to be within the acceptable risk range. Overall excess lifetime carcinogenic risks for all exposure routes were determined for reasonable worst case (i.e., 95% upper-bound confidence interval) and single worst-case well approaches. In each approach, cumulative Site risks did not exceed 1×10^{-4}, therefore cancer risks are not unacceptable.

In addition, an ecological assessment was conducted by U.S. EPA Region V which indicated potential adverse effects to aquatic organisms as a result of contaminants leaching into the wetlands adjacent to the Site's eastern border.

B. Environmental Standards Not Met at the Site

In addition to posing unacceptable risks to receptors, the Stoughton Site does not meet certain applicable or relevant and

appropriate Federal or State environmental standards at this time.

1. Cap

The existing landfill cap does not meet section NR 504.07, WAC, the current State landfill closure requirements, which have been determined to be relevant and appropriate for this Site. In part, section NR 504.07, WAC requires that the cap be composed of a 2-foot layer of compacted clay overlain by a frost-protective soil layer.

2. Groundwater

State groundwater quality standards are exceeded in the surficial aquifer beneath the western border of the Site. One sample collected during the RI indicated a high THF concentration at MW-3D of 660 µg/L, compared to the State's Enforcement Standard (ES) of 50 µg/L, and Preventive Action Limit (PAL) of 10 µg/L.

C. Groundwater Protection Goals

1. The National Contingency Plan

The U.S. EPA's groundwater protection goal has been set forth in the NCP:

> "The national goal of the remedy selection process is to select remedies that are protective of human health and the environment, that maintain protection over time, and that minimize untreated waste" (Section 300.430(a)(1)(i)).

The NCP details that the U.S. EPA

> "expects to return usable groundwaters to their beneficial uses wherever practicable, within a time frame that is reasonable given the particular circumstances of the Site. Whenever restoration of groundwaters is not practicable, (the U.S.) EPA expects to prevent further migration of the plume, prevent exposure to the contaminated groundwater, and evaluate further risk reduction" (Section 300.430(a)(1)(iii)(F)).

Also, the NCP considers the use of institutional controls to limit exposures to hazardous substances in the groundwater:

> "(The U.S.) EPA expects to use institutional controls such as water use and deed restrictions to supplement engineering controls as appropriate for short- and long-term management to prevent or limit exposure to hazardous substances,

pollutants, or contaminants....The use of institutional controls shall not substitute for active response measures as the sole remedy unless such response measures are determined not to be practicable..." (Section 300.430(a)(1)(iii)(D)).

2. State of Wisconsin

The State's groundwater protection goals are set forth in Chapter 160, Wisconsin Statutes (Wis. Stats.), which applies to all groundwater in the State. (The State's groundwater quality standards are set forth in Ch. NR 140, WAC.) Chapter 160, Wis. Stats., and Ch. NR 140, WAC, are utilized by all State agencies which regulate facilities, practices, or activities that may affect groundwater quality. Consistent with these statutes, the remedial alternatives evaluated in the FS must achieve adequate protection of human health and the environment (when implemented), and protect the groundwater resources of the State.

3. Clean-up Standards

The clean-up standards for groundwater are the State Preventive Action Limits (PALs), as set forth in ch. NR 140, Wis. Adm. Code. Additional clean-up standards consistent with the NCP and the ROD may be specified by U.S. EPA, in consultation with WDNR, for other contaminants detected during monitoring which lack a NR 140 numeric standard. These clean-up standards apply to those contaminants found during the RI phase which exceeded PALs, as well as any contaminants which are found to exceed PALs during groundwater monitoring. The PAL for THF is 10 µg/L; the ES for THF is 50 µg/L.

Section NR 140.28, WAC, provides for establishing a Wisconsin alternative concentration limit (WACL) if (1) background concentrations exceed preventive action limits (PALs) and/or enforcement standards (ESs) or (2) if it is determined that it is not technically or economically feasible to achieve PALs. Except where the background concentration of a compound exceeds the State enforcement standard (ES), the WACL established may not exceed the ES for the contaminant.

The NCP provides that remediation levels should generally be attained at or beyond the edge of the waste management area when waste is left in place. In order to determine whether or not groundwater extraction will be required to achieve compliance with State NR 140 groundwater quality standards, sample results from all wells in the monitoring program shall be considered when evaluating the groundwater quality of the Site.

D. Summary

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementation of the response action selected by this Record of Decision, may present an imminent and substantial endangerment to public health, welfare, or the environment. Therefore, based on the findings in the RI report and the discussion above, a Feasibility Study (FS) was performed to focus the development of alternatives to address the risks at the Site. The FS report documents the evaluation of the magnitude of Site risks, Site-specific applicable or relevant and appropriate requirements (ARARs), and the requirements of CERCLA and the NCP in the derivation of remedial alternatives for the Stoughton Site.

IX. DOCUMENTATION OF SIGNIFICANT CHANGES

The Responsiveness Summary attached hereto addresses the comments received during the 30 day public comment period on the Proposed Plan. The Proposed Plan recommended excavation and consolidation of saturated waste along the eastern boundary of the Site, placement of an NR 504 solid waste cap over the landfill, groundwater extraction, treatment and discharge to the Yahara River, land use restrictions and long-term groundwater monitoring as the principal elements of the remedial action. This alternative is listed as Alternative 7 in the Description of Alternatives, Section X.

In response to public comments, U.S. EPA, in consultation with the State, has concluded that additional investigation of the extent of the THF contaminant plume and further sampling to determine current concentrations of THF in the groundwater is warranted. The information obtained from the additional investigations will be used to assess whether the extraction and treatment of groundwater as proposed in Alternative 7 is required to meet State groundwater quality standards and to comply with the requirements of the NCP. Therefore, this Record of Decision selects a response action which will consist of the following components: NR 504 cap; groundwater extraction and treatment to achieve NR 140 groundwater quality standards, unless (after further investigation of the extent of the contaminant plume and the concentrations of contaminants) U.S. EPA, in consultation with the State, determines that groundwater extraction and treatment is not required to meet State groundwater quality standards and to comply with the requirements of the NCP; excavation of all the saturated waste and its consolidation with the other landfill waste; continued monitoring of the groundwater; fencing; and land-use restrictions as far as practicable. This alternative is identified as Alternative 7A in Section X, Description of Alternatives.

Because of Site-specific circumstances at the Stoughton City Landfill Site, the following criteria will be used to determine whether or not groundwater extraction and treatment is required:

1. State groundwater quality standards will be presumed to be met without groundwater extraction and treatment if, within 12 months after the effective date of this ROD, no sample from any monitoring well indicates the attainment or exceedance of any PAL.

2. If there is an attainment or exceedance of an ES in any sample collected during the 12-month period after the effective date of this ROD, groundwater extraction and treatment will be initiated in compliance with a schedule to be determined by U.S. EPA, in consultation with the State, unless a Groundwater Assessment Report is submitted to U.S. EPA and the State by the PRPs within 12 months after the effective date of this ROD which evaluates all new and pre-existing groundwater monitoring data for the Site, and U.S. EPA, in consultation with the State, determines that: (1) It is probable that no PAL will be attained or exceeded at or beyond the edge of the NR 140 design management zone (DMZ) or the property boundary, whichever is closer to the waste boundary, ten (10) years after the effective date of this ROD; and (2) In the absence of groundwater extraction and treatment, the remedy selected in this ROD will still be protective of public health and the environment, taking into account any contaminants detected in the groundwater at and beyond the waste boundary. If U.S. EPA determines, in consultation with the State, that the criteria set forth in this paragraph are met, groundwater monitoring will continue as otherwise required, for at least thirty years after waste consolidation and the completion of cap construction. At any time during, or at the end of, the first five (5) years of groundwater monitoring, following waste consolidation and completion of cap construction, U.S. EPA, in consultation with the State, may require subsequent Groundwater Assessment Report(s) which shall evaluate all monitoring results obtained to date, to determine whether or not State groundwater quality standards, including source control requirements, will be complied with, within ten (10) years after the effective date of this ROD. If at any time U.S. EPA, in consultation with the State, determines that, based on monitoring results, that State groundwater quality standards will not be met unless additional action is taken, groundwater extraction and treatment will be initiated and will continue until PALs are no longer attained or exceeded at any monitoring point at or beyond the waste boundary, or until an alternative concentration limit (ACL) established pursuant to NR 140.28, is no longer attained or exceeded at any monitoring point at or beyond the waste boundary.

3. If a PAL is attained or exceeded but there is no attainment or exceedance of any ES within 12 months after the effective date

of this ROD, groundwater extraction and treatment will not be required at that time. However, groundwater monitoring will continue as otherwise required, for a minimum of thirty (30) years after waste consolidation and completion of cap construction. If at any time monitoring reveals that State groundwater quality standards will not be met within ten (10) years after the effective date of this ROD unless additional action is taken, groundwater extraction and treatment will be initiated and continue until PALs are no longer attained or exceeded at any monitoring point at or beyond the waste boundary, or until an ACL established pursuant to NR 140.28, is no longer attained or exceeded.

X. DESCRIPTION OF ALTERNATIVES

The major objective of the FS and the Proposed Plan was to evaluate remedial alternatives consistent with the goals and objectives of CERCLA, as amended by SARA.

1. Alternative 1: No-Action

The no action includes no further activities at the Site other than a long-term program of groundwater monitoring. The frequency of groundwater monitoring would be on a quarterly basis and would involve the monitoring wells installed during the RI/FS. The groundwater samples collected would be analyzed for the current parameters as well as Target Compound List (TCL) volatile and semivolatile organics, Target Analyte List (TAL) inorganics, tetrahydrofuran, dichlorofluoromethane, and trichlorofluoromethane. This groundwater monitoring program would be implemented as part of all six alternatives on a quarterly basis.

Under the No-Action alternative, no active response would occur, other than long-term groundwater monitoring. The current rate of precipitation infiltration, through the cap and landfill waste towards the groundwater and surface water, is projected to increase in the future as frost damage, animal burrowing, and erosion continues. No reduction of the rate of leaching of contaminants to the groundwater would be provided by this alternative, thus no risk reduction would result from this action. Monitoring of the groundwater contaminant plume would be implemented to monitor potentially significant impacts to the City wells and potential discharges of contaminants to the surface water and sediments of the Yahara River and adjacent wetlands.

Initial capital costs are estimated to be $5,000. Operation and Maintenance (O&M) costs associated with sampling events and analytical work are estimated at $134,600 annually. Therefore,

over 30 years, this alternative would cost $2.1 million to implement, on a net present value (NPV) basis.

2. Alternative 2: Cap Repair and Upgrade

This alternative would combine repair and upgrade of the existing cap with fencing of the landfill boundary to restrict access, and deed restrictions to prevent the installation of wells in the affected area and to prohibit construction over the completed landfill cap. Fencing, use restrictions and additional groundwater monitoring are common elements in all of the alternatives except the No Action alternative. These actions would reduce the potential for exposure to soils and solid waste in the landfill. The upgraded cap would also minimize the amount of precipitation infiltration throughout the landfill.

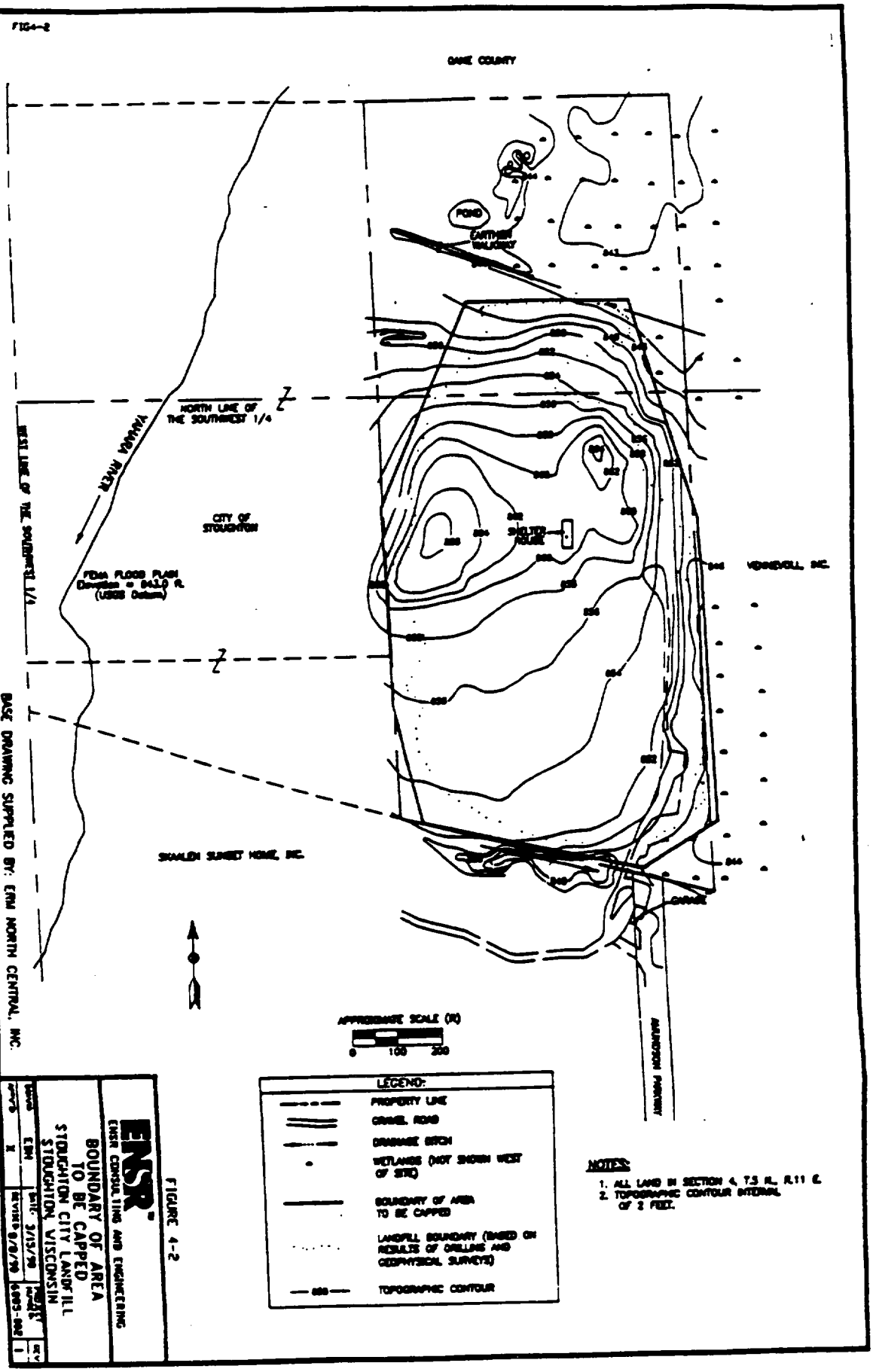
Prior to repair, the cap would have to be investigated to assess its overall condition. Soil borings to determine the thickness and materials used in construction of the cap would be required as part of this investigation. Any erosion, depressions, cracks, or animal holes would also be documented.

After assessment of its condition, affected areas of the cap would be repaired or upgraded to ensure that all areas where waste disposal occurred were covered with 2 feet of compacted clay and 6 inches of topsoil consistent with WAC NR 506.08(3) regulations. The compacted clay would have a permeability of 1 x 10^{-7} cm/sec. The permeability and thickness of this layer would be equivalent to the hydraulic barrier layer required under current Wisconsin regulations for solid waste facilities. The east edge of the landfill extends to the property boundary. When repairing the cap in this area, it will be necessary to extend the cap past the landfill property boundary. The potential need for a gas venting system following cap repair will also be considered. The total area of cap repair under this alternative is 17.6 acres. Regrading in some areas using imported fill will be required including the relatively flat area in the vicinity of the landfill shelter that has been identified as the primary groundwater recharge area. The repaired cap would also be revegetated.

Acceptable sections of the existing cap disturbed during cap repair would also be revegetated. Fencing would be installed around the capped area to prevent access, further minimizing the potential for contact with soils and waste in the landfill.

Cyclone fencing, with a locking gate at the landfill entrance, would be used. By restricting access, wear on the cap could also be reduced.

FIG4-2



BASE DRAWING SUPPLIED BY: ERM NORTH CENTRAL, INC.

NOTES:
1. ALL LAND IN SECTION 4, T5 N., R.11 E.
2. TOPOGRAPHIC CONTOUR INTERVAL OF 2 FEET.

ENSR
ENER CONSULTING AND ENGINEERING

BOUNDARY OF AREA TO BE CAPPED
STOUGHTON CITY LANDFILL
STOUGHTON, WISCONSIN

DESIGN	DRAWN	CHECKED
ERM	ERM	

DATE: 3/15/96
REVISED: 9/9/96
PROJECT NO. 0693-002
REV. 1

FIGURE 4-2

SOLID WASTE FACILITY CAP

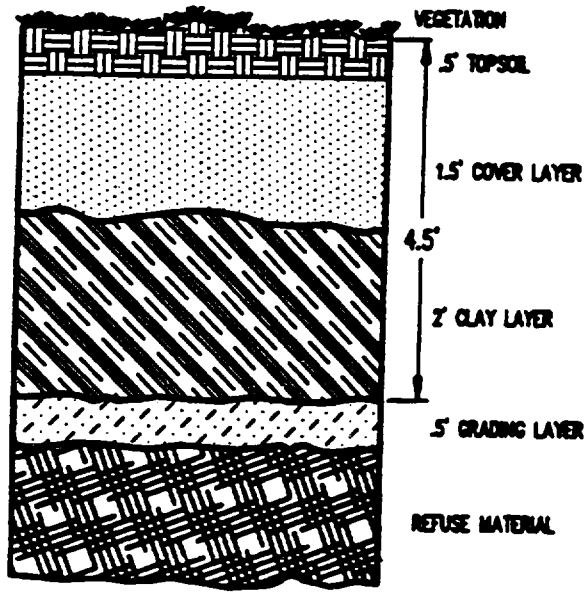


FIGURE 4-3

ENSR™
ENSR CONSULTING AND ENGINEERING

MULTILAYER CAP SECTION
STOUGHTON CITY LANDFILL
STOUGHTON, WISCONSIN

DRAWN: R.D.JOHNSON	DATE: 6/20/91	PROJECT NUMBER:	REV
APPV'D: X	REVISED: X	6885-002	0

6885\68850006 6/20/91

Groundwater use in the area would be prevented by obtaining deed restrictions on the use and placement of wells in the affected area.

This alternative would cost $2.2 million for initial capital costs, and $146,600 annually for O&M. Therefore, over 30 years, this alternative would cost $4.4 million (NPV) to implement.

3. Alternative 3: Solid Waste Cap

This alternative would include placing a new multilayer clay cap over the entire landfill area. This cap would meet the requirements for the Wisconsin NR 504.07 regulations concerning cover systems for solid waste disposal facilities. Regrading of certain parts of the landfill using imported fill would be required. The area to be capped is seen in Figure 4-2. No portion of the Site situated within the flood plain would be capped; only the elevated waste disposal area would be capped.

After preparing the surface, a multilayer clay cap would be installed. The areal extent of the cap would be the same as for the repaired or upgraded cap described in Alternative 2. The cap to be installed would consist of a 0.5-foot grading layer, a 2-foot clay barrier layer, a minimum 1.5-foot cover layer, and a vegetated 0.5-foot topsoil layer. The grading layer would be constructed from the existing cap. The clay barrier layer is required to have a compacted permeability of 1×10^{-7} cm/sec or less. (Figure 4-3).

A passive gas extraction system to collect gas from beneath the cap would be required. The need for treatment of air emissions from this system can only be determined based on actual Site data when the system is installed. For the purpose of this evaluation, it is assumed that minimal air emission controls will be required. Although this assumption may impact the cost to operate and maintain a capping system, it is assumed that equal cost impact will be encountered by all capping alternatives. Thus comparison of costs between alternatives is not affected and the potential for an overinflated operating cost is avoided.

The landfill boundary would be fenced to restrict access. Groundwater monitoring and use deed restrictions, as described under Alternatives 1 and 2, respectively, would also be implemented as part of this alternative.

This alternative would cost $3 million for initial capital costs and $146,600 annually for O&M costs. Therefore, over 30 years, this alternative would cost $5.2 million (NPV) to implement.

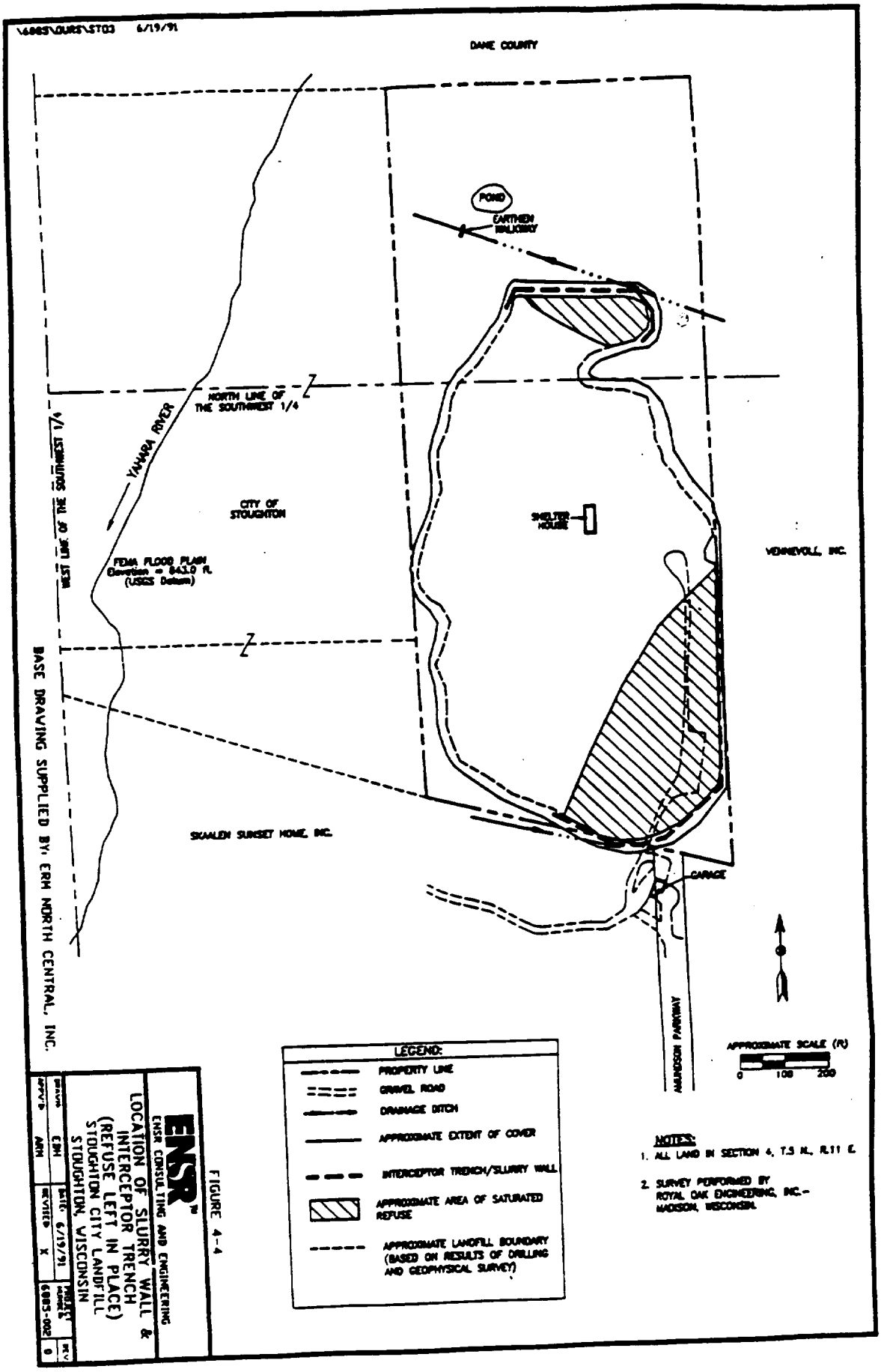
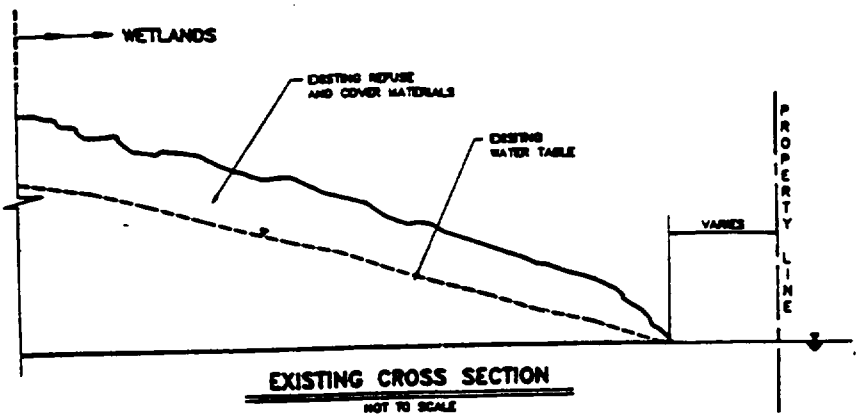
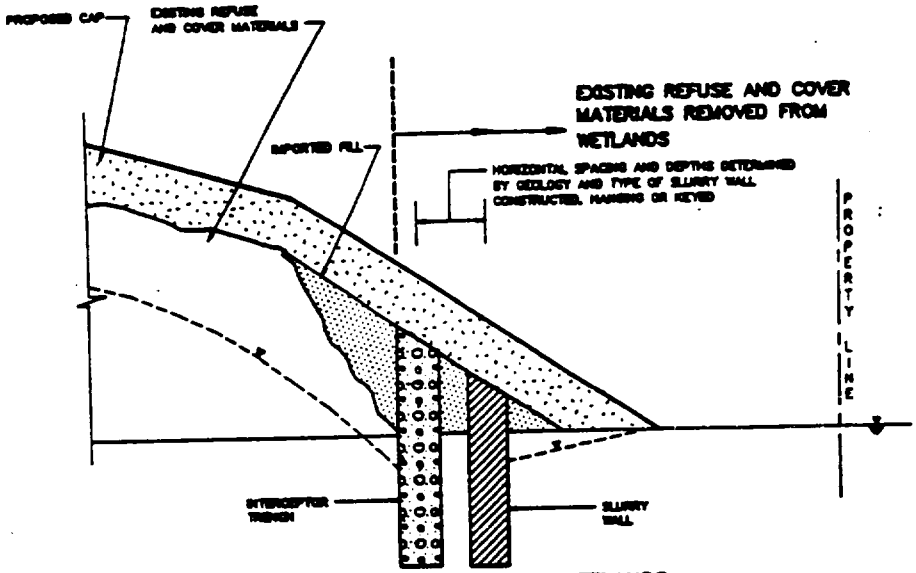

\6885\OURS\ST03 6/19/91
DANE COUNTY
POND
EARTHEN RAILROAD
NORTH LINE OF THE SOUTHWEST 1/4
YAHARA RIVER
EAST LINE OF THE SOUTHWEST 1/4
CITY OF STOUGHTON
SHELTER HOUSE
FEMA FLOOD PLAIN Elevation = 843.0 FL (USGS Datum)
VENNEVOLL, INC.
SKAALEN SUNSET HOME, INC.
GARAGE
ANDERSON PARKWAY
BASE DRAWING SUPPLIED BY: ERM NORTH CENTRAL, INC.
LEGEND:
PROPERTY LINE
GRAVEL ROAD
DRAINAGE DITCH
APPROXIMATE EXTENT OF COVER
INTERCEPTOR TRENCH/SLURRY WALL
APPROXIMATE AREA OF SATURATED REFUSE
APPROXIMATE LANDFILL BOUNDARY (BASED ON RESULTS OF DRILLING AND GEOPHYSICAL SURVEY)
APPROXIMATE SCALE (FT)
0 100 200
NOTES:
1. ALL LAND IN SECTION 4, T.5 N., R.11 E.
2. SURVEY PERFORMED BY ROYAL OAK ENGINEERING, INC.- MADISON, WISCONSIN.
ENSR CONSULTING AND ENGINEERING
LOCATION OF SLURRY WALL & INTERCEPTOR TRENCH (REFUSE LEFT IN PLACE) STOUGHTON CITY LANDFILL STOUGHTON, WISCONSIN
DRAWN EDH
APP'D ARH
DATE 6/19/91
REVISED X
PROJECT NUMBER 6885-002
REV 0

FIGURE 4-4

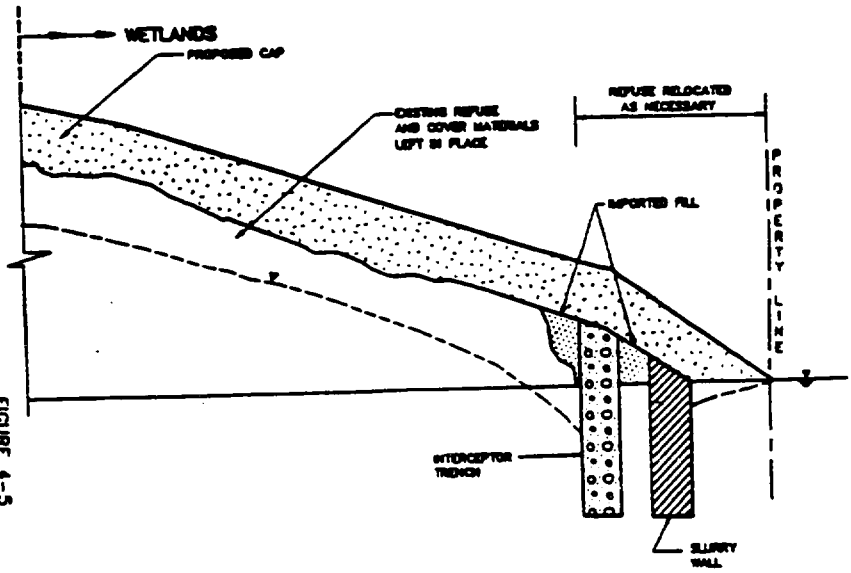
6685\OURS\ST01 6/19/91



EXISTING CROSS SECTION
NOT TO SCALE



REFUSE REMOVED FROM WETLANDS
NOT TO SCALE



REFUSE LEFTIN WETLANDS
NOT TO SCALE

FIGURE 4-5

ENSR™
ENSR CONSULTING AND ENGINEERING

TYPICAL SLURRY WALL & INTERCEPTOR TRENCH CROSS-SECTIONS
STOUGHTON CITY LANDFILL
STOUGHTON, WISCONSIN

DRAWN	DATE	PROJECT NUMBER	REV
EDH	6/19/91	6685-002	0
APPVD. AM	REVISED		

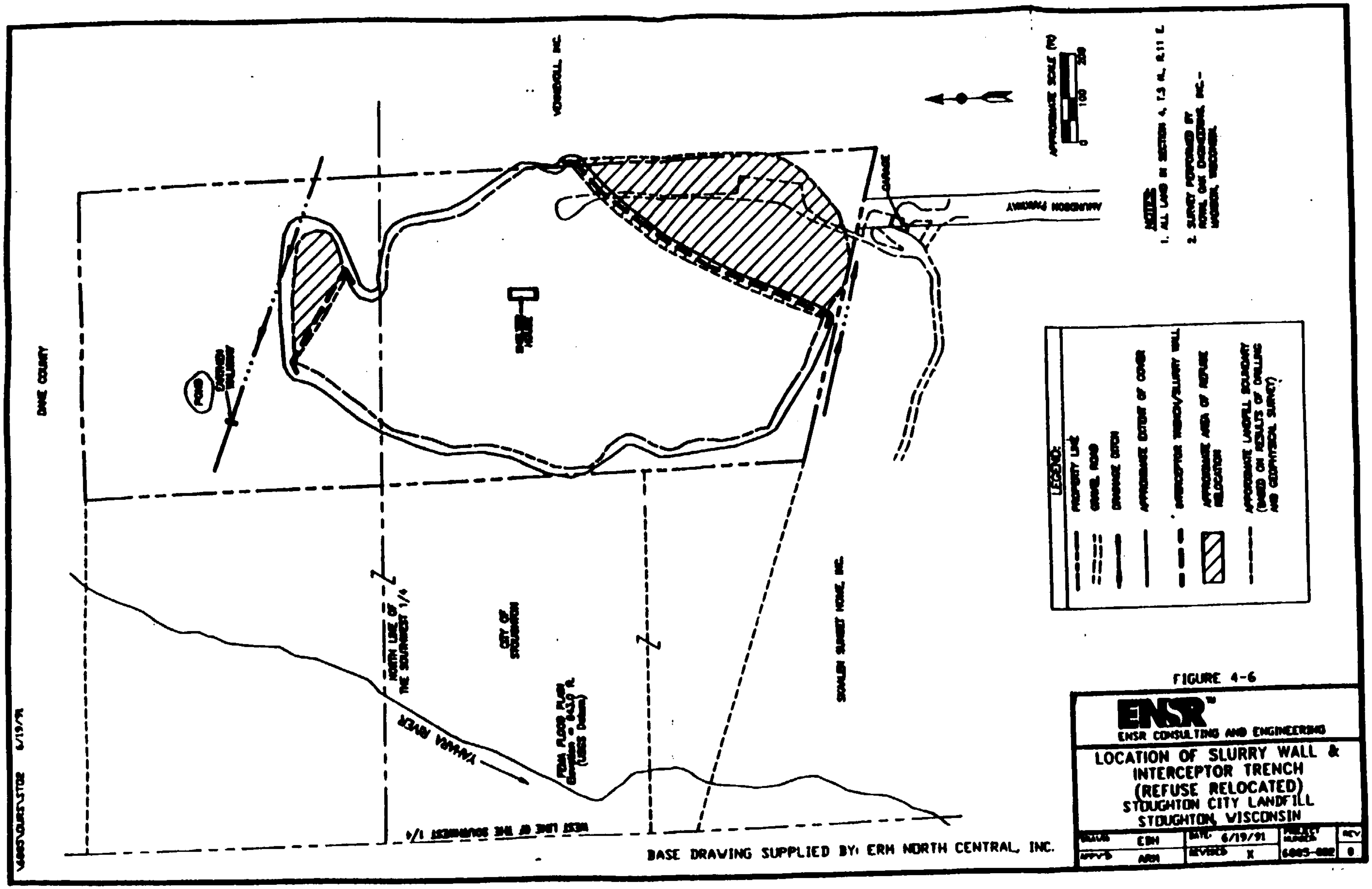


FIGURE 4-6

LOCATION OF SLURRY WALL & INTERCEPTOR TRENCH (REFUSE RELOCATED)
STOUGHTON CITY LANDFILL
STOUGHTON, WISCONSIN

would consist of temporary impermeable basins into which the excavated refuse would be placed. The refuse would be allowed to drain, and the water collected for treatment in the same leachate treatment system constructed to treat leachate from the interceptor trenches. The dewatered refuse would then be relocated to the top of the landfill, and eventually capped along with the rest of the landfill. The total area of the landfill requiring a cap would be reduced by excluding areas from which waste was removed. After completion of the solid waste dewatering, the temporary basins would be removed.

Installation of trenches and slurry walls would be completed after excavation of saturated wastes, with these structures being located at the edge of the excavation farthest from the wetland. Fill would be imported to the Site to backfill the excavated area on the north of the landfill and to fill and slope the excavation face in the southeast part of the landfill. The fill along the southeastern excavation face would be graded such that the maximum slope would be 25 percent.

This alternative would cost $8.4 million for initial capital costs and $351,600 annually for O&M costs. Therefore, over 30 years, this alternative would cost $13.8 million (NPV) to implement.

6. Alternative 5: Solid Waste Cap with Groundwater Pump and Treat

The details of cap construction and related issues would be the same as those discussed for Alternative 3. Gas control would be as described for Alternative 3.

A groundwater collection and treatment system would be a component of this alternative. The exact number of wells, their locations, depths, and their pumping rates would be determined based on treatability studies. However, for cost estimation purposes, it was assumed that two groundwater recovery wells would be installed downgradient (west) of MW-3D. The wells would collectively pump groundwater to collection piping at a rate of approximately 75 gpm, which would carry the water to the on-Site treatment facility. Well construction and pump installation standards, as outlined in WAC NR 112, would be complied with. An effluent discharge permit would have to be obtained, under the Wisconsin Pollutant Discharge Elimination System (WPDES), if treated groundwater is discharged off-Site. Substantive State effluent discharge standards would have to be complied with, if the treatment groundwater is discharged on-Site.

For cost estimate purposes, it was assumed that surface biological treatment would be used to remove tetrahydrofuran from the groundwater. The most effective process for this Site will be determined based on treatability studies. However, for cost

estimation purposes, a fixed-film, plug flow reactor configuration has been selected.

Treatability studies will be conducted during remedial design in order to determine the optimum treatment process for removing THF and other contaminants of concern from the groundwater beneath the Site. For cost estimation purposes, the FS assumed that the THF plume would be managed via above ground biological treatment.

This alternative would cost $3.7 million for initial capital costs, $210,800 annually for the O&M costs first five years, and $146,600 annually thereafter. Therefore, over 30 years, this alternative would cost $6.2 million (NPV) to implement.

7. Alternative 6A: Solid Waste Cap with Physical Barrier and Groundwater Pump and Treat

The cap would be as described in Alternative 3. The details of construction and related issues would be the same as those discussed for Alternative 3. Gas control would be as described for Alternative 3. The details of installation and operation of the groundwater interceptor/barrier trenches, and optional relocation of saturated solid waste is as described for Alternative 4. The details of groundwater collection and treatment would be as described for Alternative 5.

This alternative would cost $7.7 million for initial capital costs, $393,800 annually for the O&M costs first five years, and $146,600 annually thereafter. Therefore, over 30 years, this alternative would cost $13.4 million (NPV) to implement.

8. Alternative 6B: Solid Waste Cap with Consolidation of Waste, Physical Barrier, and Groundwater Pump and Treat

This alternative is similar to Alternative 6A but includes the waste excavation and consolidation option along with the construction of a physical barrier.

This alternative would cost $9.1 million for initial capital costs, $393,800 annually for the first five years, and $146,600 annually thereafter. Therefore, over 30 years, this alternative would cost $14.8 million (NPV) to implement.

9. Alternative 7: Solid Waste Cap with Consolidation of Waste and Groundwater Pump and Treat

This is the alternative identified in the Proposed Plan as the Agency's preferred alternative.

The cap would meet requirements of WAC NR 504 for final cover systems for solid waste disposal facilities. The details of

construction and related issues would be the same as those discussed for Alternative 3. Gas control would be as described for Alternative 3.

This alternative would also consist of excavating wastes in contact with groundwater along the landfill's northeastern and southeastern boundaries, and consolidation along the Site's western boundary. This would remove the direct contact of wastes and groundwater and will result in less impact to the wetlands adjacent to the Site's eastern border.

The contaminated groundwater plume to the west of the Site would be extracted via a system of extraction wells and treated above ground to comply with numeric WPDES and Best Available Treatment (BAT) requirements. The method of treatment will be determined during remedial design, depending on the results of treatability studies during design. For FS cost estimate purposes, it was assumed that surface biological treatment would be employed. Treated groundwater will be discharged to the Yahara River.

This alternative would cost $5.2 million for initial capital costs, $393,800 annually for O&M costs for the first five years, and $146,600 annually thereafter. Therefore, over 30 years, this alternative would cost $8.5 million (NPV) to implement.

10. Alternative 7A: Solid Waste Cap with Consolidation of Waste and Contingency Groundwater Pump and Treat

This alternative is a modification to Alternative 7, the preferred alternative identified in the Proposed Plan, and this alternative comprises the solid waste cap and waste consolidation components of Alternative 7. As described in Section IX, the groundwater component of this remedy is subject to contingencies.

A groundwater extraction and treatment system would be required unless the results of additional investigation of the sand and gravel aquifer and the bedrock aquifer indicate that NR 140 groundwater quality standards will be met without groundwater extraction and treatment. This determination will be made as described in Section IX.

The exact number of extraction wells, their locations, depths, and their pumping rates will be determined by U.S. EPA, in consultation with WDNR, based on pump tests. However, for cost estimation proposes, it was assumed that two groundwater extraction wells would be installed downgradient (west) of MW-3D. The wells would collectively pump groundwater to collection piping at a rate of approximately 75 gpm, which would carry the water to the on-Site treatment facility. Well construction and pump installation standards, as outlined in WAC NR 112, would be complied with. An effluent discharge permit would have to be obtained, under the Wisconsin Pollutant Discharge Elimination

System (WPDES), if treated groundwater is discharged off-site. Substantive State effluent discharge standards would have to be complied with, if the treatment groundwater is discharged on-site.

If groundwater pump and treat is required, the cost of this alternative, in terms of capital cost, annual operating costs and net present worth are identical to that of Alternative 7. In the event that groundwater pump and treat is determined not to be required, the capital cost of this alternative would be approximately $4.5 million; annual operating costs would be approximately $329,600 for the first five years and $146,600 thereafter; and over 30 years, the NPV would amount to $7.5 million.

XI. SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

A. The Nine Evaluation Criteria

The FS examined eight alternatives, including the No Action alternative, and evaluated them according to technical feasibility, environmental protection, public health protection and institutional issues. In addition to these eight, the Proposed Plan presented a ninth alternative which was a "hybrid" of Alternatives 4B and 5, excluding the physical barrier. The U.S. EPA carried forth each of these alternatives for evaluation in its Proposed Plan. In response to public concerns over limited groundwater contamination data, U.S. EPA, in consultation with WDNR, has proposed a tenth alternative which comprises the components of Alternative 7, but allows for groundwater extraction and treatment on a contingency basis, as identified in Section IX above. The alternatives were evaluated according to the following nine criteria which are used by the U.S. EPA to provide the rationale for the selection of the final remedial action at a Site:

THRESHOLD CRITERIA

1) **Overall Protection of Human Health and the Environment** addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced or controlled through treatment, engineering controls, or institutional controls.

2) **Compliance with State and Federal Regulations (ARAR's)** addresses whether or not a remedy will meet all the applicable or relevant and appropriate requirements of Federal and State environmental statutes and/or provides grounds for invoking a waiver.

PRIMARY BALANCING CRITERIA

3) **Reduction of Toxicity, Mobility, or Volume Through Treatment** is the anticipated performance of the treatment technologies a remedy may employ.

4) **Short-Term Effectiveness** addresses the period of time needed to achieve protection, and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until clean-up goals are achieved.

5) **Long-Term Effectiveness and Permanence** refers to the ability of a remedy to maintain reliable protection of human health and the environment over time once clean-up goals have been met.

6) **Implementability** is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

7) **Cost** includes estimated capital and operation and maintenance costs, and net present worth costs.

MODIFYING CRITERIA

8) **State Acceptance** indicates whether, based on its review of the RI/FS and the Proposed Plan, the State concurs, opposes, or has no comment on the preferred alternative at the present time.

9) **Community Acceptance** are assessed in the Record of Decision following a review of the public comments received on the RI/FS report and the Proposed Plan.

B. Comparative Analyses of Alternatives

In accordance with the NCP, the relative performance of each alternative is evaluated using the nine criteria (Section 300.430(e)(9)(iii) as a basis for comparison. An alternative providing the "best balance" of tradeoffs with respect to the nine criteria is determined from this evaluation.

Each alternative was evaluated using the nine criteria. The regulatory basis for these criteria comes from the National Contingency Plan and Section 121 of CERCLA (Clean-up Standards). Section 121(b)(1) states that, "Remedial actions in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances, pollutants, and contaminants is a principal element, are to be preferred over remedial actions not involving such treatment. The off-Site transport and disposal of hazardous substances or contaminant materials without such treatment should be the least favored alternative remedial action where practicable treatment

technologies are available." Section 121 of CERCLA also requires that the selected remedy be protective of human health and the environment, cost effective, and use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.

Each alternative is compared to the nine criteria in the following section:

1) Overall Protection of Human Health and the Environment.

Overall protection of human health and the environment addresses whether a remedy eliminates, reduces, or controls threats to human health and to the environment. The major exposure pathways of concern at the Stoughton Site are the potential ingestion of contaminated groundwater, exposure to or ingestion of contaminated surface water and/or sediments in the Yahara River and the wetlands adjacent to the Site, and inhalation of airborne volatile organic contaminants. Based upon these pathways of concern, the remedial action alternatives were evaluated on their ability to: 1. reduce precipitation infiltration through the landfill, which reduces the levels of contaminants leaching into the groundwater; 2. meet clean-up standards, and; 3. reduce the levels of hazardous substances discharging into the wetlands.

Alternatives 1 and 2 are not protective of human health and the environment. Alternatives 3, 4A and 4B will prevent direct contact with waste, and Alternatives 4A and 4B will prevent or minimize further contact between groundwater and contaminants along the eastern Site boundary. However, none of these alternatives address the ground-water contamination to the west of the Site. Alternatives 6A, 6B, 7 and 7A will prevent direct contact with the waste, prevent or minimize further contact between groundwater and contaminants along the eastern Site boundary, and will remove contaminants from groundwater to the west of the Site, unless additional monitoring indicates that groundwater extraction is not required. Alternative 5 will prevent direct contact with the waste, will remove contaminants from the groundwater west of the Site, unless additional monitoring indicates that groundwater extraction is not required, but will not prevent or minimize further contact with groundwater and contamination along the eastern boundary.

Only Alternatives 6A, 6B, 7 and 7A will achieve the three objectives stated in the above paragraph, and therefore only Alternatives 6A, 6B, 7 and 7A are considered protective of human health and the environment. Alternatives 1 through 5 are therefore not protective of human health and the environment for reasons stated in this paragraph.

2) Compliance with Applicable or Relevant and Appropriate Requirements (ARARs).

This criterion evaluates whether an alternative meets applicable or relevant and appropriate requirements set forth in Federal, or more stringent State, environmental standards pertaining to contaminants found at the Site (chemical specific), siting requirements itself (location specific) or proposed actions at the Site (action specific). The Statutory Determinations Section, Section XIII, discusses all the potential ARARs for the Site. This section only notes those ARARs with which a particular alternative does not comply.

Alternatives 1 and 2 fail to meet any of the chemical-specific ARARs described in section XII, nor do they meet the NR 504.07, WAC landfill requirements for landfill closure, which are relevant and appropriate for this Site.

Alternative 3 would not meet NR 140 requirements pertaining to the PAL for THF because it would not prevent the continued release of contaminants already present in the groundwater detected at the waste boundary above Wisconsin groundwater quality standards. It also fails to meet State Water Quality Criteria for wetlands, NR 103, and the State wetlands antidegradation regulations, NR 105, because it does not address the continuing leaching of metals from the saturated waste and their discharge into the wetlands.

Alternative 4 would comply with the State Water Quality Standards ARAR but not the NR 140 groundwater standards.

Alternative 4B would not comply with NR 140 groundwater standards.

Alternative 5 would not comply with the State Water Quality Standards.

Alternatives 6A, 6B, 7 and 7A would comply with all applicable or relevant and appropriate requirements.

Because they are not protective of human health and the environment and do not meet all ARARs, and therefore do meet the threshold criteria, Alternatives 1 through 5 will not be considered for further evaluation.

3) Reduction of Toxicity, Mobility, or Volume (TMV) Through Treatment.

None of the alternatives considered will reduce the toxicity, mobility or volume of solid waste through treatment. Alternatives 6A, 6B, 7 and 7A will offer some reduction in the amount of contaminants currently found in the groundwater through

treatment. Due to the low risks posed from contact with or ingestion of the Site waste, and because of the large volume of wastes in place, the benefit of treating the source of the contamination at the Site would be marginal and extremely expensive.

4) Short-Term Effectiveness.

Because wastes will be excavated and relocated, Alternatives 6A 7 and 7A would present the potential for workers to inhale or ingest Site contaminants. The additional amount of protection will have to be evaluated taking into account the disadvantages of additional waste handling, potential increased exposure to waste, and increased handling of leachate from dewatering excavated wastes. Site workers would be trained and required to wear personal protection equipment during excavation activities. Because of the proximity of houses to the Site, there is a potential for Site contaminants to become airborne and wind blown and inhaled by nearby residents. However, air monitoring stations would be set up around the entire Site to determine the levels of contaminants in the air and to ensure that these levels are safe. Placement of the cap can be completed in less than one year. For Alternatives 6A and 6B, the installation of a physical barrier along the southeastern and northeastern sections would require additional time to complete. For Alternatives 6A, 6B, 7 and 7A, ground-water restoration measures west of the Site will take many years to complete.

5) Long-Term Effectiveness and Permanence.

Alternatives 6A, 6B, 7 and 7A would provide long-term protection from direct contact with wastes and reduce the infiltration of water into the landfill area. The effectiveness of these alternatives is dependent on proper maintenance of the cap.

Alternatives 6B, 7 and 7A involve the excavation and relocation of disposed waste followed by consolidation onto the western portion of the landfill. Because wastes currently in contact with groundwater along the eastern portion of the Site will be removed, these alternatives would offer a more secure long-term solution to this problem than Alternative 6A. The long-term effectiveness of Alternative 6A would be dependent on the proper maintenance of the physical barrier to be installed.

Alternatives 6A, 6B, 7 and 7A would offer a permanent solution to ground-water contamination by pumping contaminated groundwater west of the Site and treating it prior to discharge to the Yahara River.

6) Implementability.

Construction equipment necessary for installation of the multilayer cap is readily available and cap construction does not present difficult technical or engineering challenges. Alternatives 6B, 7 and 7A would require the excavation, relocation and consolidation of wastes. This would present some technical difficulty but is still technically feasible. Alternative 6A may cause impacts on the wetlands adjacent to the Site and east of the landfill as a result of construction of the physical barrier. This physical barrier would be designed in such a way as to minimize adverse impacts on the wetlands. Surface water levels in the wetlands may be affected as a result of the physical barrier. This situation would be evaluated and a system would be designed to maintain proper surface-water levels. Alternatives 6A, 6B, 7 and 7A would require a ground-water pumping system designed in such a way as to not result in lowering of the wetlands water levels.

7) Cost.

The cost of the selected alternative, if groundwater extraction and treatment is required, is estimated to be $8.5 million, net present worth, over a 30 year life. If groundwater extraction and treatment is not required, the 30 year NPV is $7.5 million. When compared to Alternatives 6A and 6B, the selected alternative meets the threshold criteria at significantly lower costs. For a comparison of costs of alternatives at varying discount factors, refer to Table "Cost Est."

8) State Acceptance.

The State of Wisconsin concurs with the selected remedy. The WDNR is a signatory to the RI/FS Consent Order with the City of Stoughton and Uniroyal, and has been an active and supporting participant in the remedial process for this Site.

9) Community Acceptance.

The specific comments received and U.S. EPA's responses are outlined in the Attached Responsiveness Summary.

XII. THE SELECTED REMEDY

U.S. EPA and WDNR believe that Alternative 7A is the most appropriate solution for the SCL Site because of its performance against the nine evaluation criteria previously discussed. The major components of the selected alternative include the following: NR 504 cap; groundwater extraction and treatment for removal of the THF plume west of the landfill, unless additional monitoring indicates that extraction is not required to achieve compliance with State groundwater quality standards; and

STOUGHTON CITY LANDFILL
COMPARATIVE COSTS OF REMEDIAL ALTERNATIVES

TABLE COST EST.

REMEDIAL ALTERNATIVE	CAPITAL COSTS	ANNUAL O&M COSTS		NET PRESENT VALUE OVER 30-YR PROJECT LIFE (at 10% discount rate)	NET PRESENT VALUE OVER 30-YR PROJECT LIFE* (at 5% discount rate)	NET PRESENT VALUE OVER 30-YR PROJECT LIFE (at 3% discount rate)
ALTERNATIVE 1: No Action	$5,000	Yrs. 1-30:	$134,600	$1,274,000 -39%	$2,074,000 0%	$2,643,000 27%
ALTERNATIVE 2: Cap Repair & Upgrade	$2,155,300	Yrs. 1-30:	$146,600	$3,537,000 -20%	$4,409,000 0%	$5,029,000 14%
ALTERNATIVE 3: Solid Waste Cap	$2,983,442	Yrs. 1-30:	$146,600	$4,365,000 -17%	$5,237,000 0%	$5,857,000 12%
ALTERNATIVE 4A: Solid Waste Cap with Physical Barrier	$6,944,000	Yrs. 1-30:	$351,600	$10,259,000 -17%	$12,349,000 0%	$13,836,000 12%
ALTERNATIVE 4B: Solid Waste Cap with Consolidation of Waste and Physical Barrier	$8,408,000	Yrs. 1-30:	$351,600	$11,723,000 -15%	$13,813,000 0%	$15,300,000 11%
ALTERNATIVE 5: Solid Waste Cap with 5-yr. Groundwater Pump & Treat	$3,696,000	Yrs. 1- 5:	$210,800	$5,321,000 -15%	$6,228,000 0%	$6,863,000 10%
		Yrs. 6-30:	$146,600			
ALTERNATIVE 6A: Solid Waste Cap with Physical Barrier and GW Pump & Treat (costed for 5 yrs.)	$7,707,000	Yrs. 1- 5:	$393,800	$10,026,000 -9%	$11,031,000 0%	$11,713,000 6%
		Yrs. 6-30:	$146,600			
ALTERNATIVE 6B: Solid Waste Cap with Consolidation of Waste, Physical Barrier and GW Pump & Treat (costed for 5 yrs.)	$9,121,000	Yrs. 1- 5:	$393,800	$11,440,000 -8%	$12,445,000 0%	$13,127,000 5%
		Yrs. 6-30:	$146,600			
ALTERNATIVE 7: Solid Waste Cap with Consolidation of Waste and GW Pump & Treat (costed for 5 yrs.)	$5,200,000	Yrs. 1- 5:	$393,800	$7,519,000 -12%	$8,524,000 0%	$9,206,000 8%
		Yrs. 6-30:	$146,600			
ALTERNATIVE 7A *: Solid Waste Cap with Consolidation of Waste and GW Pump & Treat Contingency (not costed)	$4,500,000	Yrs. 1- 5:	$329,600	$6,576,000 -13%	$7,546,000 0%	$8,212,000 9%
		Yrs. 6-30:	$146,600			

NOTE: * Superfund program RI/FS guidance recommends that a discount rate of 5% before taxes and after inflation be assumed, as shown in the shaded column and as used by the PRPs in the FS Report. Net Present Values shown are rounded to the nearest $1,000. Percentages shown in Net Present Value (NPV) columns compare NPV against NPV in shaded column. Alternative 7A was not presented in the Proposed Plan. This table is revised from FS Report Table 7-1.

excavation and consolidation of saturated wastes. Alternative 7A also includes the installation of a fence around the Site; the placement of institutional controls such as deed restrictions to control future land use; and the use of long-term ground-water monitoring to determine the effectiveness of the cap and ground-water extraction system, if required.

The selected remedy is the final remedial alternative to be implemented at the Stoughton Site, encompassing all areas of concern at the landfill. The areas of concern are considered to be the groundwater contaminant plume located to the west of the landfill boundary and leachate generation along the eastern boundary of the Site which is impacting the adjacent wetlands area. The landfill itself is considered to be a low-level, long-term threat to human health and the environment, primarily as a further source of groundwater contamination.

The alternative recommended by U.S. EPA, after consultation with WDNR, for the Stoughton City Landfill Site, Alternative 7A, provides the best balance with respect to the nine criteria. Based on information available at this time, U.S. EPA believes that the recommended remedy is protective of human health and the environment, complies with ARAR's and is cost effective.

The evaluation of the other alternatives found that:

* Alternatives 1, 2, 3, 4A, 4B and 5 are not protective of human health and the environment and/or do not comply with ARARs.

* Alternative 6A will address the potential for further ground-water contamination east of the Site by placing a physical barrier along the southeast and northeast sections of the landfill, thereby limiting the movement of contaminants away from the Site. This alternative would also effectively limit contaminant movement through the waste and treat ground-water contamination west of the Site. However, the barrier would pose maintenance problems and would not offer the long-term reliability that Alternatives 7 and 7A would offer.

* Alternative 6B would address ground-water contamination problems and would also effectively limit contamination movement through the waste. However, this Alternative is more costly than the recommended Alternative.

XIII. STATUTORY DETERMINATIONS SUMMARY

1. Protection of Human Health and the Environment

The selected remedy will prevent direct contact with wastes and reduce contaminant levels in the aquifer to the State's NR 140

standards. In addition, the selected remedy will provide for protection of the eastern wetlands by preventing or mitigating further effects from leachate generation from wastes situated in the water table in the southeastern and northeastern sections of the Site.

2. Attainment of ARARs

The selected remedy will attain all Federal and State applicable or relevant and appropriate requirements as presented in the FS and in this Record of Decision. In addition, the selected remedy will attain all Federal and State "To Be Considered" requirements as described in the FS and in this Record of Decision.

1. Chemical specific ARARs

Chemical specific ARARs regulate the release to the environment of specific substances having certain chemical characteristics. These requirements generally set health or risk-based concentration limits or discharge limitations after treatment in various environmental media for specific hazardous substances. The selected remedy would achieve compliance with the following chemical specific ARARs related to groundwater, surface water discharges and ambient air quality at the site.

A. Federal

1. Maximum Containment Levels (MCLs) and Maximum Containment Level Goals (MCLGs), 40 CFR Part 141. These are enforcable drinking water standards established by U.S. EPA under the Safe Drinking Water Act (SDWA), 40 U.S.C. § 300 et. seq. MCLs are applicable when the water will be provided directly to 25 or more people or will be supplied to 15 or more service connections and are to be measured at the tap. Because the groundwater at the SCL Site is not currently a source of drinking water, MCLs are not applicable. At the Stoughton site, MCLs and MCLGs are relevant and appropriate, since the sand and gravel aquifer is a Class IIa aquifer (a potential drinking water source) which could potentially be impacted by the contaminant plume. MCLGs are relevant and appropriate when the standard is set at a level greater than zero (for non-carcinogens). The point of compliance for MCLs and MCLGs is at the boundary of the landfilled-wastes. At the SCL Site no MCLs or above-zero MCLGs are currently exceeded.

2. Ambient Water Quality Criteria, 40 CFR Part 131, developed under the Clean Water Act (CWA), 33 U.S.C. § 1251 et. seq. for protection of human health and aquatic life. The Federal Ambient Water Quality Criteria (AWQC) are non-enforceable guidelines that set pollutant concentration limits to protect surface waters that are applicable to point source discharges, such as from industrial or municipal wastewater streams. At the SCL Site, the

treated groundwater will be discharged to the Yahara River. CERCLA section 121(d)(1) requires the U.S. EPA to consider whether AWQC would be relevant and appropriate under the circumstances of a release or threatened release, depending on the designated or potential use of groundwater or surface water, the environmental media affected, and upon the latest information available. At a Superfund site, the Federal AWQC would not be applicable since they are non-enforceable guidelines, but they are relevant and appropriate for pretreatment requirements for discharge of treated water to a Publicly Operated Treatment Works (POTW). Since treated water will be discharged to the Yahara River, AQWC adopted for drinking water and AWQC for protection of freshwater aquatic organisms are relevant and appropriate to the point source discharge of the treated water into the Yahara River. AWQC adopted for drinking water and AWQC for protection of freshwater aquatic organisms are relevant and appropriate to the discharge of the treated groundwater into the Yahara River.

3. National Ambient Air Quality Standards, 40 CFR Part 50. May be applicable to air stripping, fugitive dust raised from excavation, grading and other construction activities. Every available precaution will be taken during construction to minimize fugitve dust emissions. In the event air stripping is used to treat groundwater prior to discharge to the Yahara River, any emissions for which there are standards will be monitored. However, it is not anticipated that air stripping of THF will release any listed contaminents.

B. State

1. The State of Wisconsin is authorized to administer the implementation of the Federal SDWA. The State has also promulgated groundwater quality standards in Ch. NR 140, WAC, which the WDNR is consistently applying to all facilities, practices, and activities which are regulated by the WDNR and which may affect groundwater quality in the State. Chapter 160, Wis. Stats., directs the WDNR to take action to prevent the continuing release of contaminants at levels exceeding standards at the point of standards application. Groundwater quality standards established pursuant to Ch. NR 140, WAC, include preventive action limits (PALs), enforcement standards (ESs), and/or (Wisconsin) alternative concentration limits (WACLs). Because State PALs are more stringent than federal MCLs, and because there are no MCLs for certain of the contaminents of concern, notably THF, State PALs are applicable to the Stoughton site as groundwater clean-up standards.

Consistent with the exemption criteria of section NR 140.28, WAC, a Wisconsin alternative concentration limit (WACL) may be established to replace the preventive action limit (PAL), as the groundwater clean-up standard if it is determined that it is not

technically and economically[1] feasible to achieve the PAL for a specific substance. Except where the background concentration of a compound exceeds the enforcement standard (ES) consistent with the criteria in section NR 140.28(4)(B), the WACL that is established may not exceed the ES for that compound.

The implementation of the selected remedy at the Stoughton site will be in compliance with Ch. NR 140, WAC, in that preventive action limits (PALs) will be met at and beyond the edge of the waste management area unless WACLs are established pursuant to the criteria in section NR 140.28, WAC, in which case the WACLs will be met.

2. Section 303 of the CWA requires the State to promulgate state water quality standards for surface water bodies, based on the designated uses of the surface water bodies. CERCLA remedial actions involving surface water bodies must ensure that applicable or relevant and appropriate state water quality standards are met. The State has promulgated Wisconsin Water Quality Criteria (WWQC) under Ch. NR 105, WAC, based on the Federal AWQC developed by U.S. EPA. The Yahara River is designated as a warm water sport fish community under Ch. NR 105, WAC. The warm water sport fish WWQC are therefore applicable to the maintenance of surface water quality impacted by the discharge of treated groundwater from the site.

3. The State is authorized to implement the National Pollutant Discharge Elimination System (NPDES) program. For discharge of treated water, the applicable or relevant and appropriate requirements are dependent on the point of discharge. The substantive requirements of a Wisconsin Pollutant Discharge Elimination System (WPDES) permit, under Ch. NR 220, WAC, would be applied to the discharge of the treated water into the Yahara River, since the discharge point is considered to be on-site. Subject to the approval of the U.S. EPA, effluent limits for surface water discharge will be established by the WDNR. Ch. NR 220, WAC requires that the effluent limits be based on the application of best available treatment technology (BAT) prior to discharge.

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[1] A determination of technical or economic infeasibility may be made, no earlier than five years after operation of the ground water extraction system begins, if it becomes apparent that the contaminant level has ceased to decline over time and is remaining constant at a statistically significant level above the PAL (or any WACL established due to high background concentrations) in a discrete portion of the area of attainment, as verified by multiple monitoring wells.

2. Action specific ARARs

Action specific ARARs are technology or activity based requirements or limitations on actions taken with respect to hazardous waste. They indicate how a selected remedy must be achieved.

A. Federal

1. Clean Water Act section 404 prohibits the deposit of dredged or fill material in wetlands without a permit. The substantive prohibition will be observed during site activities pertaining to remedy implementation.

2. Executive Order 11990 - Protection of Wetlands, is an applicable requirement to protect against the loss or degradation of wetlands. The selected remedy will comply with this Order in the design of the groundwater extraction system, when excavating the saturated waste, when constructing the cap and when designing or implementing any other component of the remedy.

3. RCRA Subtitle C. RCRA is not applicable at the Site because the jurisdictional requirement that the facility have treated, stored or disposed of RCRA hazardous waste after July 26, 1982 is not met. Disposal ceased at the SCL in 1972 and the landfill was closed in 1980. However, certain of the RCRA requirements pertaining to the cap and future monitoring of the facility are relevant and appropriate.

4. RCRA Subtitle D. The cap proposed for the Stoughton site consists of a grading layer, a minimum 2-foot compacted clay layer, a gravel drainage layer, a frost protective soil layer, and a minimum 6-inch topsoil layer. These components satisfy the requirements of RCRA Subtitle D and also section NR 504.07, WAC, which is the relevant and appropriate requirement for this site. (See discussion of State action specific ARARs below).

5. If air stripping is chosen as the method for treating extracted groundwater prior to discharge, that activity, as well as the handling of contaminated soil during excavation, consolidation of waste and cap construction could cause air emissions in exceedances of Clean Air Act standards. The design of the selected remedy will either reduce such emissions to acceptable levels or treat them to comply with standards.

B. State

1. Ch. NR 102, WAC establishes an antidegradation policy for all waters of the State and it establishes water quality standards for use classifications. Chapter NR 102, WAC would be applicable to actions that involve discharges to the Yahara River in that discharges must meet water quality standards.

2. Ch. NR 103, WAC, establishes water quality standards for wetlands. Ch. NR 103, WAC, would be applicable to actions that affect wetlands. The implementation of the selected remedy will reduce contaminated groundwater discharge to the wetlands and thus comply with the anti-degradation provisions of Ch. NR 103, WAC, and assure that significant adverse impacts to the wetlands will not occur in the future.

3. Chapter NR 504, WAC is not applicable to this site because it regulates the closure of currently permitted solid waste landfills in the State. Since the Ch. NR 504, WAC closure requirements are sufficiently similar to the requirements for closure of the Stoughton site, in that a cap of sufficient integrity to minimize liquid infiltration into the waste is necessary to retard further leaching of contaminents into the groundwater, Ch. NR 504, WAC requirements are relevant for the Stoughton site. Chapter NR 504, WAC requirements are well-suited for the Stoughton site due to the reduction of precipitation infiltration and the long-term effectiveness offered by the frost protection layer. Thus, Ch. NR 504, WAC, the current solid waste landfill closure requirements, are also appropriate for this site. Section NR 504.07, WAC calls for the landfill cover to be composed of a grading layer, a minimum 2-foot clay layer with a permeability of 1×10^{-7} cm/s, a frost-protective soil layer, and a minimum 6-inch topsoil layer. These requirements will be met by the cap component of the selected remedy.

4. The State is authorized to implement the National Pollutant Discharge Elimination System (NPDES) program. For discharge of treated water, the applicable or relevant and appropriate requirements are dependent on the point of discharge. The substantive requirements of a Wisconsin Pollutant Discharge Elimination System (WPDES) permit, under Ch. NR 220, WAC, would be applied to the discharge of the treated water into the Yahara River, since the discharge point is considered to be on-site. Subject to the approval of the U.S. EPA, effluent limits for surface water discharge will be established by the WDNR. Ch. NR 220, WAC requires that the effluent limits be based on the application of best available treatment technology (BAT) prior to discharge.

5. Chapter 147, Wisconsin Statutes, is also applicable to treated water to be discharged to the Yahara River. These regulations state that no discharge shall contain quantities of listed pollutants greater than that would remain after subjecting the water to best available technology economically achievable (BATEA).

6. Chapter NR 445, WAC regulates air emissions from treatment technologies and is applicable to point source emissions from industrial facilities. Air stripping may be used to treat

groundwater prior to discharge. Since air strippers may emit hazardous substances in the form of VOCs, section NR 445.04, WAC is relevant and appropriate for the remedy. The need for emission control technology shall be evaluated based on requirements of Ch. NR 445, WAC.

7. Chapter NR 27, WAC, the State Endangered and Threatened Species Act, and Ch. NR 29, WAC, the State Fish and Game Act, are State endangered resource laws which protect against the "taking" or harming of endangered or threatened wildlife resources in the area. These would be applicable to the remedial action, in that the poisoning of endangered or threatened species by Site contaminants could be considered by the WDNR to be a "taking." To date, no threatened or endangered species have been found at the Site.

3. Location specific ARARs

Location specific ARARs are restrictions placed on the concentration of hazardous substances or the conduct of activities solely because they are in specific locations.

A. Federal

1. Executive Order 11988 - Protection of Flood Plains, are applicable to the Site due to its location within the mapped 100-year flood plain (843 feet above mean sea level) of the Yahara River. This Order would be met by designing the groundwater treatment system to be located above this elevation and be protected from erosional damage.

B. State

1. Chapter NR 112, WAC, which requires that no drinking water wells be located within 1200 feet of a landfill, unless a variance is obtained from the WDNR, is applicable to the Site.

3. Cost-Effectiveness

Cost-effectiveness compares the effectiveness of an alternative in proportion to its cost of providing its environmental benefits. The selected remedy's long-term effectiveness and its ability to reduce the amount of THF in the surficial aquifer was weighed against its short-term effectiveness aspects in relation to the remaining alternatives. In general, the selected remedy does involve a small degree of risk to Site workers and to the community in that there would be movement and treatment of hazardous substances during implementation in order to minimize the long-term effects those substances would have on human health and the environment.

With respect to VOC emissions during treatment of the groundwater and movement of saturated wastes, effective air monitoring would ensure that air standards established to protect human health and the environment are met. Emission controls may be utilized, if necessary, to meet those standards. Short-term risks due to the discharge of treated groundwater to the Yahara River would be minimized by ensuring that the treated water meets discharge criteria, which are established to protect human health and the environment as well.

The selected remedy will achieve the threshold criteria by attaining all Federal and State ARAR's and providing protection to human health and the environment, and at lower costs than Alternatives 6A and 6B.

4. Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

The selected alternative will provide for a permanent solution to the THF contaminant plume west of the Site by extracting contaminated groundwater and treating it above ground. Wastes in contact with groundwater will be excavated and placed away from the eastern wetlands, thereby providing a long-term solution to the environmental impacts to the wetlands.

5. Preference for Treatment as a Principal Element

There are no identifiable hot spots in the waste for which treatment is viable or practical. Although no test pits were conducted during the RI, analyses of borings obtained during monitoring well installation do not show elevated contaminant concentrations indicative of hot-spot disposal areas. Due to the heterogeneity of the waste, it is not feasible to excavate and treat a specific portion of the landfill.

Extraction of groundwater to the west of the Site will reduce concentrations of contaminants to levels which will meet State groundwater quality standards, if this component of the selected remedy is required as described in Section IX above.